Section A: U.S. Department of the Interior Preliminary 4(e) Conditions – BLM Reservation

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Section A: Preliminary Conditions for the Protection and Utilization of the Bureau of Land Management Reservations Pursuant to Section 4(e) of the Federal Power Act

INTRODUCTION

The Department of the Interior (Department) through the Bureau of Land Management (BLM) has developed conditions pursuant to Section 4(e) of the *Federal Power Act* (FPA) for the protection and utilization of BLM-administered reservation affected by the Klamath Hydroelectric project, FERC No. 2082 (Project). Section 4(e) of the FPA provides that "…licenses issued within any reservation…shall be subject to and contain such conditions as the Secretary of the department under whose supervision such reservation falls shall deem necessary for the adequate protection and utilization of such reservation." The FPA definition of reservation includes lands and interest in lands owned by the United State, and withdrawn, reserved, or withheld from private appropriation and disposal under the public land laws.

The BLM manages federal lands (BLM lands) within and near the Project boundaries that are "reservations" as defined by the FPA. Specifically, the BLM lands are located adjacent to J.C. Boyle Reservoir and along the J.C. Boyle Bypass and Peaking reaches of the Klamath River. The J.C. Boyle Development primarily resides on BLM lands, including the J.C. Boyle Powerhouse, J.C. Boyle Canal, J.C. Boyle Bypass and Peaking reaches and Project roads. (See BLM Map 1 below.)

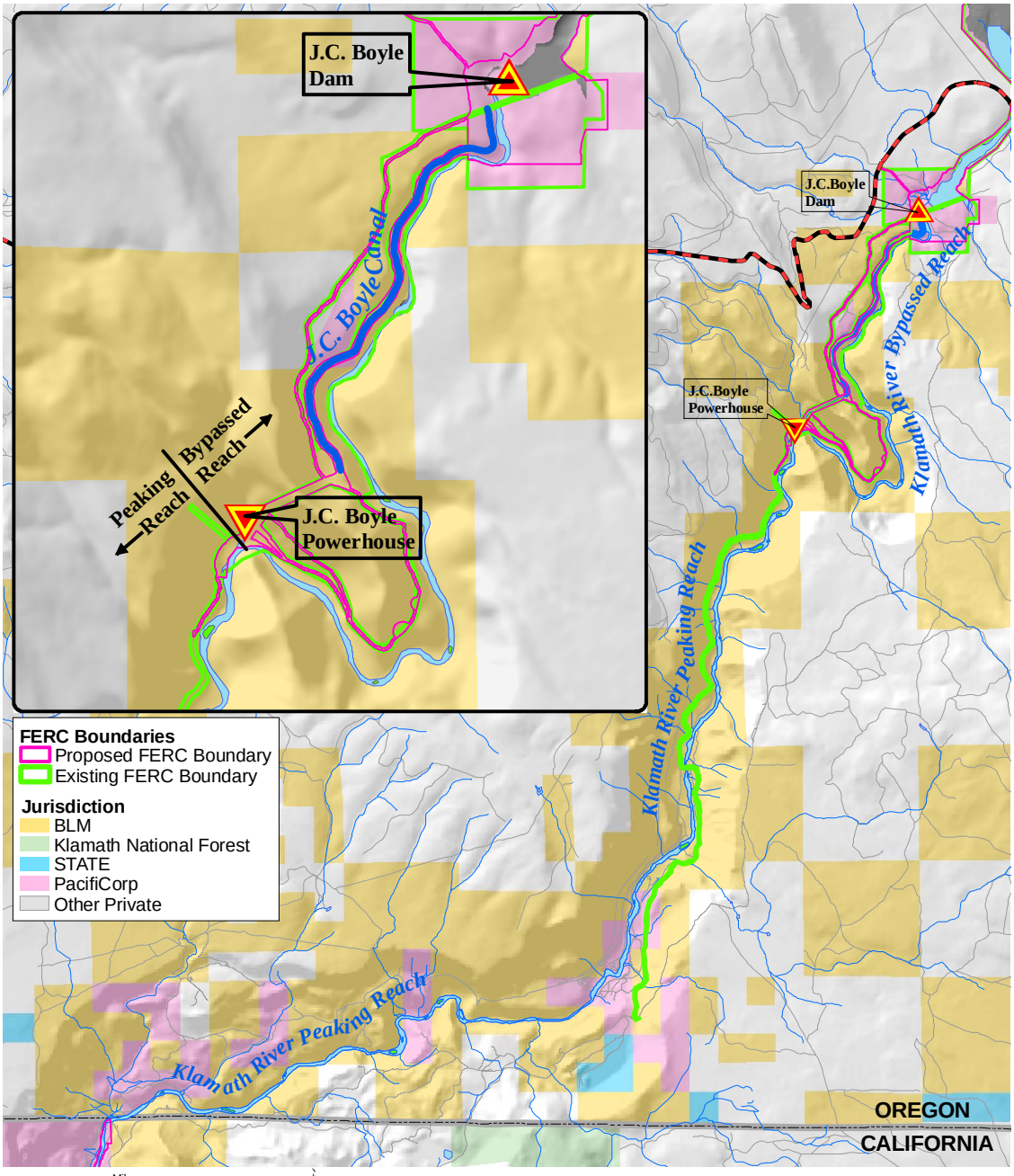
Currently, the BLM lands are withdrawn by either the *Revested Oregon and California Railroad Grant Lands Act* (O&C Act) or Power Site Reserve No. 258 (See BLM Map 2 below):

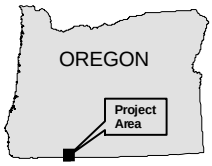
- The O&C Act (50 Stat 874) provided that these BLM lands were to be "conserved and perpetuated" rather than divested by the United States and be managed as timberlands and power site lands that shall be managed for purposes[1] provided for in BLM resource management plans developed for these areas.
- The Power Site Reserve No. 258 was approved by Executive Order dated April 13, 1912 and reserved BLM lands withdrawing them from "settlement, location, sale, or entry, and reserved for water-power site". These BLM lands were originally reserved under the *Pickett Act of 1910*[2] but subsequently withdrawn by Power Site Reserve No. 258.

[1] In addition to providing for a permanent source of timber supply according to the principle of sustained yield, the O&C Act requires the Secretary to protect watersheds, regulate stream flow, provide recreation, and contribute to economic stability.

[2] The Pickett Act of 1910 authorized the Executive Department to "temporarily withdraw from settlement, location, sale, or entry any public lands of the United States…and reserve the same for water-power sites, irrigation, classification of lands, or other public purposes to be specific in the orders of withdrawals: "[S]uch withdrawals or reservations shall remain in force until revoked…" "…and therefore in law and in practice Pickett Act withdrawals can continue indefinitely." Opinion of the Solicitor, M-37005 (January19, 2001).

BLM Map 1: J.C. Boyle Development and Lands under BLM Jurisdiction

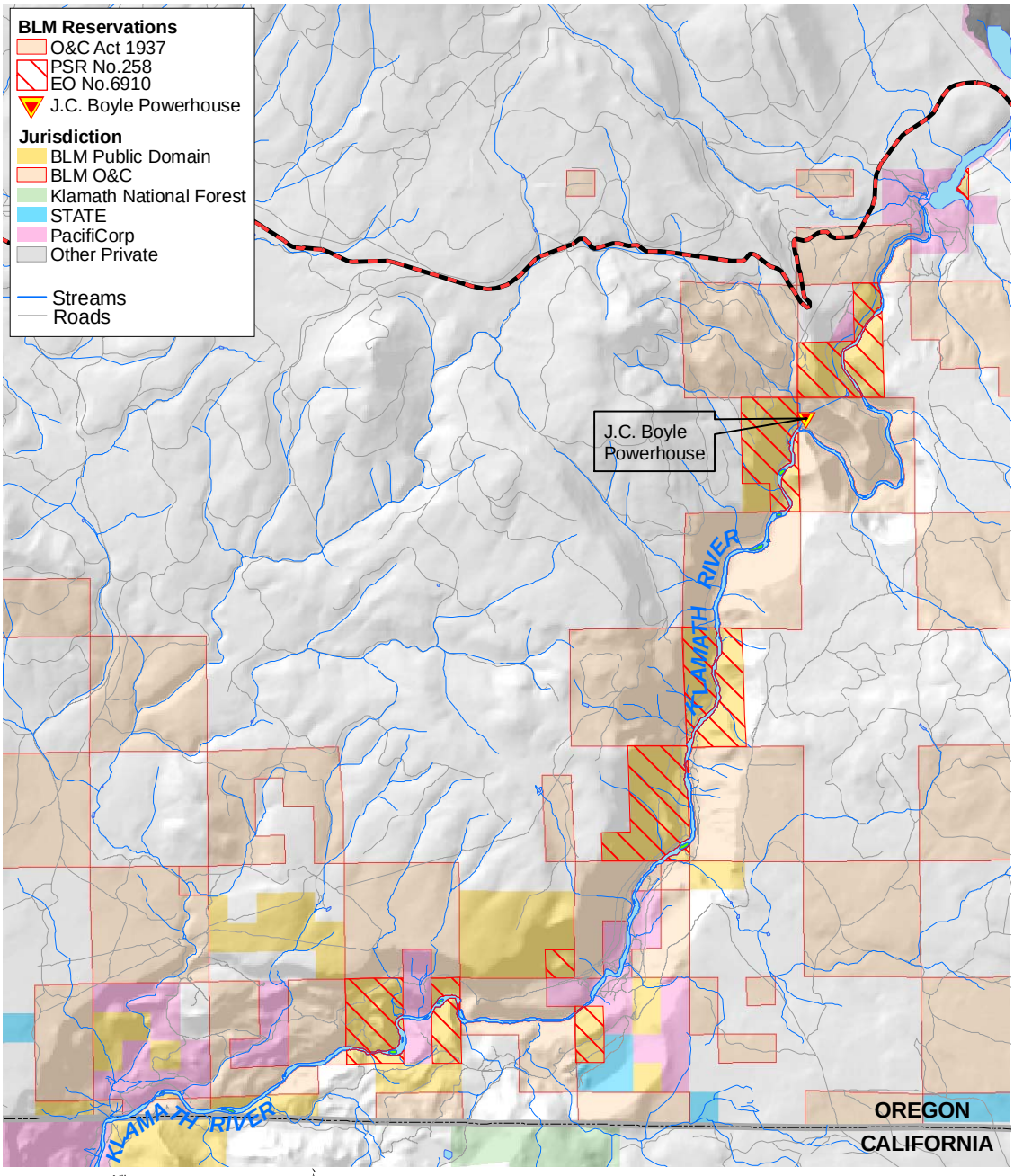




Klamath Hydroelectric Project
J.C.Boyle Development
FERC No. 2082
2006

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Klamath Falls Resource Area
Lakeview District
2795 Anderson Ave. #25
Klamath Falls, Oregon 97603

BLM Map 2: BLM Reservation Lands Map



BLM Reserved Lands
Klamath Hydroelectric Project
FERC No. 2082
2006

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Klamath Falls Resource Area
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RESOURCE MANAGEMENT PLAN GOALS AND OBJECTIVES

The continued protection and utilization of the BLM reservation requires management on the basis of multiple use and sustained yield according to provisions of the *Federal Land Policy Management Act* (FLPMA). This act directs BLM to develop and maintain management plans, by specific areas, for public use and requires an interdisciplinary approach to achieve an integrated consideration of the physical, biological, economic and other sciences (FLPMA, 1976).

FPLMA also defines the term multiple use to mean:

> "…the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less then all of the resources; a combination of balanced and diverse resource use that takes into account the long-term needs of future generations for renewable and non-renewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output."

The Klamath Falls Resource Area Resource Management Plan (RMP), Rangeland Program Summary, and Record of Decision (ROD) (USDI BLM 1995a); the Medford District RMP and ROD (USDI BLM 1995b); and the Redding Field Office RMP and ROD (USDI BLM 1993) were developed in accordance with FLPMA. The Klamath Falls Resource Area and Medford District RODs and RMPs are also consistent with and incorporate provisions of the 1994 Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan).

The Klamath Falls Resource Area RMP responds to the need for healthy forest ecosystems and habitat to support native species, including protection of riparian areas and waters as well as the need for a sustainable supply of timber and other forest products necessary to maintain local and regional economies (USDI BLM 1995a). The Klamath Falls Resource Area encompasses 212,000 acres including 19,450 acres of "Riparian Reserves" in Klamath County, Oregon. The Klamath River occurs in the Northwest Forest Plan area and is administered as a riparian reserve.[3] According to the Klamath Falls Resource Area RMP the riparian reserve for the Klamath River includes "the stream and the area on each side of the stream extending from the edges of the active stream channel to the outer edges of the 100 year floodplain or 320 feet on each side of the river, whichever is greater" (USDI BLM 1995a). As a general rule, management of riparian reserves prohibits or regulates activities that retard or prevent attainment of objectives of the Aquatic Conservation Strategy (ACS).

[3] Riparian reserves are designed to restore and maintain aquatic ecosystem functions and together with the Aquatic Conservation Strategy (ACS) provide substantial watershed protection benefits including attaining and maintaining water quality standards and moderating peak stream flows.

The ACS seeks to prevent degradation and restore habitat and ecosystem health by maintaining and restoring aquatic habitat, restoring habitat connectivity, and maintaining flows sufficient to sustain component elements of aquatic systems.[4] Among specific provisions of the ACS are provisions for managing roads, energy production, recreation, lands, riparian areas, fish and wildlife, and watershed and habitat restoration. Specific provisions for land management as it relates to hydroelectric projects under the jurisdiction of the Federal Energy Regulatory Commission (Commission) are provisions requiring BLM input on the maintenance of instream flows and habitat conditions and maintenance/restoration of riparian resources and stream channel integrity necessary to ensure that ACS objectives are met (USDI BLM 1995a).

The BLM reservation is located within the Project boundaries and therefore subject to conditions that the Secretary of the Interior, acting through the BLM, deems "… necessary for the adequate protection and utilization of [these] reservation[s]." (FPA). As explained in greater detail below, the Project affects water resources, recreation, wild and scenic river values, travel and access management, cultural resources, terrestrial and riparian resources, special status species and fish and wildlife resources within these BLM lands. The BLM has developed conditions for the license that are designed to provide for the adequate protection and utilization of the BLM reservation based on multiple use objectives. Where project impacts affect BLM resources that lie outside of these reservations, the BLM has included measures as recommendations pursuant to FPA § 10(a).

The following conditions are necessary for the adequate protection and utilization of these reservations and the multiple use resource values for which the reservations are managed. These conditions are based on resources identified for management pursuant to FLPMA and approved RMPs for the Lakeview District, Klamath Falls Resource Area; Medford District and Redding Field Office. Therefore, the following conditions covering specific requirements for protection and utilization of the public lands shall also be included in any license issued for the Project.

BLM PRELIMINARY 4(e) CONDITIONS

Condition No. 1 - Activities On or Affecting Bureau of Land Management-Administered Lands

A. The Licensee shall consult with the Bureau of Land Management (BLM) to identify and resolve potential conflicts with BLM policy and direction prior to initiating activities on BLM-administered lands, which are beyond the scope of the license or for which the Licensee has not obtained BLM approval.

[4] The ACS Standards and Guidelines specific to hydropower relicensing require the BLM to "identify instream flows necessary to maintain and restore riparian resources, fish passage, and channel integrity" (USDA; USDI 1994). Lands allocated as Riparian Reserves require further evaluation to assess whether occupancy and use is acceptable and will not detract from or can be mitigated so that ACS objectives can continue to be met (USDA; USDI 1994).

B. The Licensee shall cooperate with the BLM to obtain the appropriate authorizations for use or access to BLM-administered lands prior to engaging in any activity that has the potential to affect other federally authorized rights-of-way (ROW) on those lands.

C. The Licensee shall obtain written approval from BLM prior to changing the location of any Project feature or facility on BLM-administered lands. The Licensee shall also obtain written approval for any actions that are inconsistent with authorizations for use or occupancy of BLM-administered lands according the new license. Following BLM approval and at least 90 days prior to any change in location or departure from an authorized activity, the Licensee shall file a report with the Federal Energy Regulatory Commission (Commission) and with the BLM, describing the change, the reasons for the change, and documenting BLM approval of the change.

D. The Licensee shall prepare site-specific plans for approval by the BLM for activities required by the license that have the potential to impact BLM-administered lands or resources. Prior to implementing any action that is not analyzed on a site-specific basis, the Licensee shall work with the BLM to evaluate whether the action could impact BLM-administered lands or resources. The analysis shall be sufficient to meet requirements of the National Environmental Policy Act (NEPA). The site-specific details shall include:

1. a map depicting the location of the proposed activity;
2. the land use allocation and management designation including standards and guidelines for the area of the proposed activity;
3. alternative locations, designs, mitigations, and implementation and effectiveness monitoring necessary to meet standards and guidelines; and
4. data from surveys, biological evaluations, or consultation required by regulation and as applicable to activities on BLM-administered lands.

(a) When surveys indicate that activities may affect an Endangered Species Act (ESA) listed or proposed listed species or their habitat, the Licensee shall evaluate the impacts of the action on the species or habitat and submit this evaluation to the BLM.

(b) When surveys indicate an activity may affect a BLM sensitive species or their habitat, based on the list of BLM sensitive species that BLM will provide to the Licensee annually, the Licensee shall evaluate the potential impact of the action and submit conclusions to the BLM for review and approval. BLM reserves the authority to require mitigation for the protection of these species.

E. Upon BLM approval, the Licensee shall conduct necessary environmental analysis according to NEPA standards and sufficient for formal consultation for federally administered resources subject to regulation pursuant to the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act (ARPA), the Native American Grave Protection Act (NAGPRA), the Clean Air Act, the Clean Water Act, and the Endangered Species Act (ESA). The environmental analysis documentation shall be sufficient to comply with BLM direction in the National Environmental Policy Act Handbook 1790-1 (USDI BLM 1988), or as amended.

F. The Licensee shall file a Safety During Construction Plan with the Commission 60 days prior to initiating any ground-disturbing activity on BLM-administered lands. This plan will identify potential hazard areas and measures necessary to protect public safety. Areas to

consider include construction activities near public roads, trails, recreation areas, and facilities.

G. The Licensee shall perform daily (or on a schedule otherwise agreed to by the BLM) inspections of Licensee's construction operations on BLM-administered lands and adjoining fee title property while construction is in progress. The Licensee shall document these inspections and deliver this documentation to BLM. Inspections must evaluate fire plan compliance, public safety, and environmental protection. The Licensee shall act immediately to address any necessary corrections.

H. The Licensee shall consult with BLM to prepare a Spoils Disposal Plan prior to initiating any ground disturbing activity on BLM-administered lands. Upon BLM approval, the plan shall be filed with the Commission. The plan shall address disposal and/or storage of waste soil and/or rock materials (spoils) generated by road maintenance, slope failures, and construction projects. The plan shall include provisions for:

1. identifying and characterizing the nature of the spoils in accordance with applicable BLM regulations;
2. identifying sites for the disposal and/or storage of spoils that prevent contamination of water by leachate and surface water runoff; and
3. developing and implementing stabilization, slope reconfiguration, erosion control, reclamation, and rehabilitation measures.

I. The Licensee shall file a Hazardous Substances Plan for oil and hazardous substance storage, spill prevention, and clean up with the Commission prior to planning, construction, or maintenance that may affect BLM-administered lands. At least 90 days prior to submission, the Licensee shall provide a copy of the plan to the BLM for its review and approval. At a minimum, the plan shall:

1. outline procedures for reporting and responding to releases of hazardous substances, including names and phone numbers of all emergency response personnel and their responsibilities; and
2. maintain emergency response and HAZMAT cleanup equipment sufficient to contain any spill from the Project.

J. On a semi-annual basis, the Licensee shall provide the BLM information on the location of spill cleanup equipment on BLM-administered lands and the location, type, and quantity of oil and hazardous substances stored in the Project area. The Licensee shall inform BLM immediately as to the nature, time, date, location, and action taken for any spill affecting BLM-administered lands.

K. The Licensee shall avoid disturbance to all public land survey monuments, private property corners, and BLM boundary markers. In the event that any markers or monuments are destroyed by an act or omission of the Licensee, in connection with the use and/or occupancy authorized by the license, depending on the type of monument destroyed, the Licensee shall reestablish or reference same in accordance with (1) the procedures outlined in the "Manual of Instructions for the Survey of the Public Land of the United States," (2) the specifications of the County Surveyor, or (3) the specifications of the BLM. The Licensee shall ensure that any such official survey records affected are amended as provided for by law.

L. The Licensee shall maintain Project-related improvements and facilities located on BLM-administered lands to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the agency. The Licensee shall comply with all applicable Federal, State, and local laws, regulations, including but not limited to, the Federal Water Pollution Control Act, 33 U.S.C. § 1251 et seq., the Resources Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et seq., the Comprehensive Environmental Response, Control, and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq., and other relevant environmental laws, as well as public health and safety laws and other laws relating to the siting, construction, operation, and maintenance of any facility, improvement, or equipment.

M. The Licensee shall restore BLM-administered lands to a condition satisfactory to BLM prior to any surrender of the Project license or abandonment of Project facilities. At least one year in advance of license surrender, facility abandonment, or Project boundary change, the Licensee shall file with the Commission a restoration or maintenance plan approved by the BLM. The plan shall identify any capital improvements that will be removed, restoration measures; maintenance of facilities abandoned but not removed, time frames, and costs. In addition, the Licensee shall commission an audit to assist the BLM in determining whether the Licensee has the financial ability to fund the decommissioning and restoration work specified in the plan.

1. As a condition of any transfer of the license or sale of the project, the Licensee shall guarantee or assure, in a manner satisfactory to the BLM, that the Licensee or transferee will provide for the costs of surrender and restoration.
2. Any license amendment that authorizes use of BLM-administered lands shall be subject to such conditions the BLM deems necessary to protect and utilize affected BLM reservations.

N. The Licensee shall indemnify, defend, and hold the United States harmless for any costs, damages, claims, liabilities, and judgments arising from past, present, and future acts or omissions of the Licensee in connection with the use and/or occupancy authorized by the license. This indemnification and hold harmless provision applies to any acts and omissions of the Licensee or the Licensee's heirs, assigns, agents, employees, affiliates, subsidiaries, fiduciaries, contractors, or lessees in connection with the use and/or occupancy authorized by this license which result in: (1) violations of any laws and regulations which are now or which may in the future become applicable, and including but not limited to environmental laws such as the CERCLA, RCRA, Oil Pollution Act, Clean Water Act, Clean Air Act; (2) judgments, claims, demands, penalties, or fees assessed against the United States; (3) costs, expenses, and damages incurred by the United States; or (4) the release or threatened release of any solid waste, hazardous substances, pollutant, contaminant, or oil in any form in the environment.

O. The Licensee shall, within one year of the license issuance, develop a standard operating procedures plan for emergencies to address procedures, environmental permits, and subsequent mitigation measures for any Project-related impacts to BLM lands including, but not limited to, the emergency spillway and canal and slope failures. This plan shall be developed with consultation and approval by BLM. The plan shall include implementation strategies for agency coordination, restoration actions, monitoring and evaluation, and potential mitigation measures.

P. The Licensee shall exercise diligence in protecting from damage the land and property of the United States covered by and used in connection with this license, including any buildings, bridges, roads, trails, lands or other property of the United States; and shall restore, reconstruct or compensate the United States for any damage resulting from negligence or from the violation of the terms of this license or any law or regulation applicable to the BLM by the Licensee, or by any agents or employees of the Licensee acting with in the scope of their agency or employment. Arrangements to restore, reconstruct, or compensate for damages shall be made with the BLM.

Rationale

BLM administers approximately 197 acres within the current Project boundary (PacifiCorp 2003a, Exhibit A, page 2-17) for recreation use, fish and wildlife habitat, terrestrial and riparian resources, cultural resource protection, and road and facilities maintenance. Project operation and/or mitigation for impacts of the Project on BLM-administered resources must insure actions are in compliance with laws, regulations, policies and land use plan decisions which the BLM is bound or is responsible for upholding or implementing. This will necessitate consultation with the BLM prior to implementation of any action on federal lands to ensure the continued protection and utilization of BLM-administered resources and for consistency with BLM management objectives for these lands.

BLM has the authority to address planning issues through direction within the *Federal Land Policy and Management Act* (FLPMA). Specifically, according to:

- Sec. 103(c) (7) "…the public lands [shall] be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use. . . ."
- Sec. 302(b) "In managing the public lands, the Secretary shall, subject to this Act and other applicable law and under such terms and conditions as are consistent with such law, regulate, through easement, permits, leases, licenses, published rules, or other instruments as the Secretary deems appropriate, the use, occupancy, and development of the public lands, including, but not limited to, long-term leases to permit individuals to utilize public lands for habitation. . . ."
- Sec. 302(d) (2) "Use of public lands pursuant to a general authorization under this subsection shall be limited to areas where such use would not be inconsistent with the plans prepared pursuant to section 202. Each such use shall be subject to a requirement that the using department shall be responsible for any necessary cleanup and decontamination of the lands used. . . ."
- Sec. 302(d) (2) (A) "…minimize adverse impacts on the natural environment, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved."
- Sec. 302(d) (5) "To the extent that public safety may require closure to public use of any portion of the public lands covered by an authorization issued pursuant to this subsection, . . . [the Secretary] shall take appropriate steps to notify the pubic concerning such closure and to provide appropriate warnings of risks to public safety."

The BLM RMPs provide direction for issuing, renewing, or granting authorizations to occupy, use or traverse BLM-administered lands for power generation, transmission, and distribution. If such actions have the potential to affect BLM-administered resources, they must be evaluated for consistency with BLM RMPs developed pursuant to FLPMA and according to the NEPA that addresses whether any irretrievable or irreversible commitment of Federal resources will result as a consequence of actions implemented on federal lands or reliant on federal funding.

Condition No. 2 – Consultation with the Bureau of Land Management

A. The Licensee shall consult with the Bureau of Land Management (BLM) between September 1 and November 31 each year and prepare a report on the status implementing conditions of the license that could affect BLM-administered resources. The report shall include:

1. Results of any monitoring preformed over the previous year for reporting effectiveness of mitigations included as license articles;
2. Review of any non-routine maintenance;
3. Discussion of any foreseeable changes to Project facilities or operations;
4. Discussion of any necessary revisions or modification to plans approved as part of this license; and
5. Discussion of elements of current year maintenance plans, e.g. road maintenance.

B. A copy of the records, plan reports, monitoring reports, and other pertinent records shall be provided to the BLM at least 10 days prior to the annual meeting, unless otherwise agreed.

C. Copies of other reports related to Project safety and non-compliance shall be submitted to the BLM concurrently with submittal to the Commission. These include, but are not limited to, any non-compliance report filed by the Licensee for facilities or operations on or affecting BLM-administered lands.

D. Within 60-days of issuance of the report to BLM, the Licensee shall file the record of consultation and any BLM comments and recommendations with the Commission. The BLM reserves the right, after notice, comment, and administrative review, to require changes to Project operation through revision of 4(e) conditions.

Rationale

The *Federal Land Policy Management Act* (FLPMA) requires the BLM to consult with other entities regarding the management of public resources. The Licensee's obligation to operate the Project in accordance with license conditions intended to mitigate for impacts to BLM determines necessary for the continued protection and utilization of federally administered resources, necessitates this consultation requirement for the Klamath Hydroelectric Project operation and would require federal action and notice and comment to rectify or mitigate.

Section 307(a) of FLPMA requires the Secretary of Interior (Secretary) through the Interior Bureaus "… to conduct investigations, studies, and experiments, [based] on [the Secretary's]

initiative or in cooperation with others, involving the management, protection, development, acquisition, and conveying of the public lands."

Condition No. 3 - Roads Inventory Analysis and Roads Management

A. Within six months of license issuance, the Licensee shall file with the Federal Energy Regulatory Commission (Commission) for approval a Project Roads Inventory Analysis and Roads Management Plan (Roads Plan) for Project-related roads that cross Bureau of Land Management (BLM)-administered lands (BLM roads). The purpose of the Roads Plan is to facilitate coordination of transportation maintenance and management; continue to provide for public safety; minimize potential damage to big game winter range; manage transportation access consistent with BLM management objectives; coordinate off-highway vehicle (OHV) management; minimize the potential for spread of noxious and invasive plants; restore hydrologic function in areas that have been impacted by use of BLM roads for Project purposes: and continue to protect cultural resources.

1. At a minimum, the Roads Plan shall include the items specified in the Final License Application (PacifiCorp 2004a, Executive Summary, page 8-5; Land Use, Visual, and Aesthetic Resources Final Technical Report, page 3-7; and Appendix 3C) and shall:
   (a) Specify the Licensee's goals and objectives for transportation management so the BLM can determine whether these are consistent BLM transportation management goals;
   (b) Identify BLM roads necessary to operate and maintain the Project;
   (c) Monitor use of roads for recreation access;
   (d) Identify responsible parties for management and maintenance of BLM roads affected by the Project;
   (e) Identify BLM roads previously used but which are no longer necessary to operate and maintain the Project;
   (f) Identify levels of use and projected future use of BLM roads;
   (g) Identify impacts associated with all Project-related BLM road use;
   (h) Develop mitigation measures for Project-related impacts to BLM roads;
      (1) Mitigate for soil erosion;
      (2) Identify and implement road closures; and
      (3) Identify and implement BMPs for maintaining and protecting cultural resources; controlling the spread of noxious weeds; protecting sensitive plants and threatened and endangered species; minimizing soil erosion; and protecting aquatic resources.
   (i) Identify instruments (agreements) necessary to implement the Roads Plan.

2. The Roads Plan shall accommodate unrestricted access by the BLM necessary to manage and administer BLM lands and resources that are affected by Project operations. The plan shall include provisions for the maintenance of crossings and rights-of-way (ROW) required by and consistent with permit requirements for powerlines, penstocks, ditches, and pipelines.

B. The Licensee shall consult with the BLM prior to erecting any signs on BLM-administered lands that are necessary for operation or maintenance of Project operations or facilities. The Licensee must obtain approval from the BLM specific to the location, design, size, color, and

content of signs. The Licensee shall be responsible for maintaining all Licensee-erected signs to neat and presentable standards.

C. The Licensee shall prepare a draft Roads Plan after consultation with the BLM. The Licensee shall allow a minimum of 30 days for the BLM to comment and to make recommendations on the draft plan before finalizing the plan and filing it with the Commission. The Licensee shall include with the plan: documentation of consultation, BLM comments and recommendations, and a description of how recommendations are accommodated by the plan. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information. At the time it files the plan with the Commission, the Licensee shall serve a copy of the filed documents upon the BLM.

D. The BLM reserves the right to require changes to the plan by filing modifications to the plan within 30 days of service. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the BLM.

Rationale

Section 302(b) of the Federal Land Policy Management Act (FLPMA) requires BLM to address road maintenance and management, and specifically authorizes the Secretary of Interior (Secretary) to "regulate, through easement, permits, leases, licenses, published rules, or other instruments as the Secretary deems appropriate, the use, occupancy, and development of the public lands, including, but not limited to, long-term leases to permit individuals to utilize public lands for habitation, …".

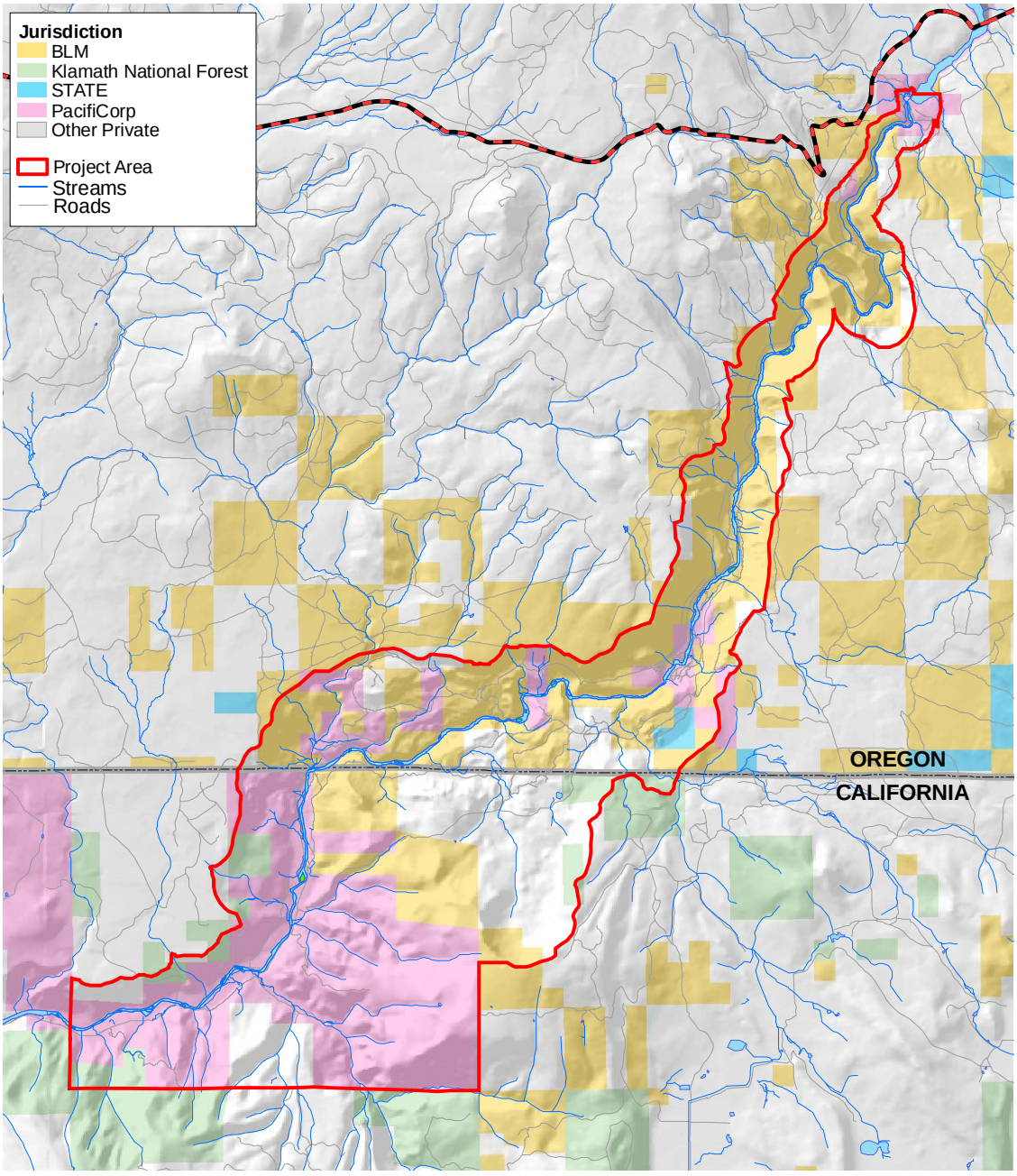
The BLM manages travel and access on roads through a road management plan (USDI BLM 1995a, page 71). Although BLM participated with the Licensee in an analysis of road conditions for roads on BLM-administered lands and PacifiCorp lands (PacifiCorp 2004h), no inventory results and analysis have been provided to BLM. In order to accurately develop travel management objectives, the Licensee needs to provide the analysis and develop a plan for management of roads in the Project area of influence. (See BLM Figure 3-1: Road Inventory Map.) PacifiCorp stated in the Land Use, Visual, and Aesthetic Resources Final Technical Report (PacifiCorp 2004h) "When completed as a post-Final License Application submittal, the inventory and analysis is intended to meet the objectives of FERC, PacifiCorp, and BLM for the management and cost-sharing responsibilities of Project-related transportation facilities."

PacifiCorp stated in the FTR (PacifiCorp 2004h) that "the data are currently being reviewed and analyzed. The analysis and management components of this study will be completed as a post-Final License Application submittal during the first half of 2004." Further, Exhibit E Land Management and Aesthetics (PacifiCorp 2004i) stated that "Project-related road management activities will be defined, including road and bridge management activities, monitoring activities, and cost-sharing responsibilities for Project related transportation facilities", and that "The results of the roadway inventory analysis and proposed roadway management actions and responsibilities will be reviewed in consultation with BLM." To date the BLM has not been consulted on the proposed management actions.

The BLM analyzed agency data compiled for the cooperative road study. Project-specific data including analysis of the Licensee's road inventory is necessary to develop a comprehensive Roads Plan and maintenance schedule. Road damage can be related to number and type of vehicles and/or frequency of trips. Data specific to PacifiCorp use of BLM roads are not available.

Project construction, maintenance, and operation necessitated the development of roads within and adjacent to the Klamath River canyon. Of these historic roads, approximately 14 miles adjacent to the J.C. Boyle Bypass and Peaking Reaches remain necessary for the operation and maintenance of the Project (PacifiCorp 2004h, Road Inventory Figure 3.7-1, 6 of 9 and 7 of 9). About 3.4 miles of these roads traverse PacifiCorp land and the remaining 10.6 miles are BLM roads. Because the Road Inventory Analysis and Road Management Plan are not complete, the level of Project use of BLM roads is not well defined. Compounding the difficulty in analyzing the affect of the Project on BLM roads is the Licensee's proposed Project boundary revision (PacifiCorp 2004a, Executive Summary, Figure ES1.1-1) that excludes numerous miles of road that the Licensee was previously required to manage and maintain. (See BLM Figure 3-2: Klamath Hydroelectric Project Roads Map.) The Roads Plan must include recommendations on how those roads should be managed including options for maintenance, improvement or closure if necessary. The BLM condition is intended to more precisely define the miles, levels of use, and projected future use of roads necessary to operate and maintain the Project in order to develop a cooperative Roads Plan. A Plan is necessary to meet the direction in the KFRA RMP, to manage travel and access on roads through a road management plan, (USDI BLM 1995a, page 71) and Section 302(b) of the Federal Land Policy Management Act (FLPMA) requiring road maintenance and management be addressed and necessary to mitigate for impacts to roads that are resultant of the Project.

BLM Figure 3-1: Road Inventory Map



2001 Road Inventory Project Area
Klamath Hydroelectric Project
FERC No. 2082
2006

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2795 Anderson Ave. #25
Klamath Falls, Oregon 97603

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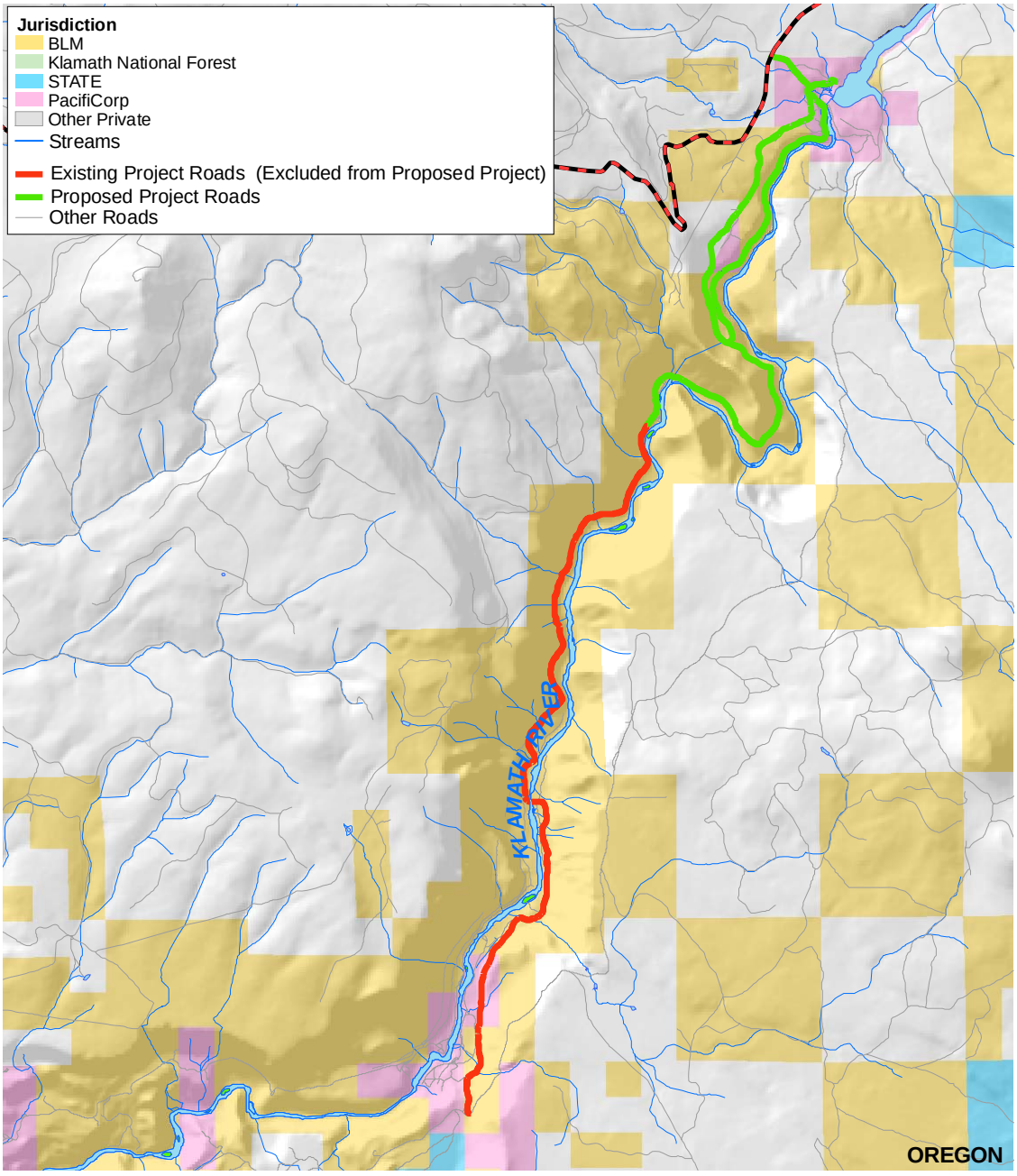
BLM Figure 3-2: Klamath Hydroelectric Project Roads



Project Roads / BLM Lands
Klamath Hydroelectric Project
FERC No. 2082
2006

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Klamath Falls Resource Area
Lakeview District
2795 Anderson Ave. #25
Klamath Falls, Oregon 97603

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Condition No. 4 – River Corridor Management

A. J.C. Boyle Bypassed River Reach

1. Required Minimum Streamflow – The Licensee shall, within one year after license issuance, maintain minimum streamflows as specified:

(a) Proportional flow requirement: Provide no less than 40% of the inflow to J.C. Boyle Reservoir to the J.C. Boyle Bypassed River Reach, measured below the J.C. Boyle Dam at RM 225. [See Condition 4 – C.1.(a)(2)].

(1) The required proportional instream flows are the average of the previous three days of the combined daily flow, as measured from the Keno gage (#11509500) and Spencer Creek gage (#11510000) combined.

(b) Minimum base flow requirement: When 40% of the inflow is less than 470 cubic feet per second (cfs), no less than 470 cfs shall be provided to the J.C. Boyle Bypassed River Reach, except when the combined flow measured from the Keno gage (#11509500) and Spencer Creek gage (#11510000) is less than 470 cfs, then flow shall be provided to the J.C. Boyle Bypassed River Reach in an amount equal to the average of the previous three days of combined flow, as measured from the Keno gage (#11509500) and Spencer Creek gage (#11510000) combined.

(c) Seasonal High Flow: At a minimum, once annually between February 1st and April 15th diversion to the J.C. Boyle Power Canal shall be suspended when inflow to J.C. Boyle Reservoir first exceeds 3,300 cfs during this time period.

(1) Suspension of diversion shall be maintained for a minimum of seven full days.

(2) The streamflow shall be measured from the Keno gage (#11509500) and Spencer Creek gage (#11510000) combined.

2. Ramping During Controlled Events – The Licensee shall, within one year after license issuance:

(a) Not exceed an up ramp rate or down ramp rate of two inches per hour when conducting controlled flow events (e.g., scheduled maintenance and changes in minimum flow requirements), except during implementation of the seasonal high flow [See Condition 4 - A.1.(c)], measured below the J.C. Boyle Dam at RM 225. [See Condition 4 – C.1.(a)].

B. J.C. Boyle Peaking Reach

1. Streamflow Requirements – The Licensee shall, within one year after license issuance:

(a) From May 1st to October 31st, operate the J.C. Boyle development to provide a streamflow of 1,500 cfs to 3,000 cfs a maximum of once a week, with a priority set for Saturday, Sunday, then Friday.

(b) Proportional and minimum base flows as prescribed in the J.C. Boyle Bypassed River Reach will provide the inflows for the J.C. Boyle Peaking Reach. [See Condition 4 – A.1.].

2. Ramping During Controlled Events – The Licensee shall, within one year after license issuance:

(a) Not exceed an up ramp rate or down ramp rate of two inches per hour when conducting controlled flow events (e.g. scheduled maintenance, power generation, changes in minimum flow requirements), except during implementation of the seasonal high flow [See Condition 4 - A.1.(c)], measured at the gage below the J.C. Boyle Powerhouse at RM 220.5 (USGS #11510700).

C. Streamflow Measurement and Reporting: J.C. Boyle Bypassed River and Peaking Reaches

1. Instream Flow Measurement – The Licensee shall, within one year after license issuance:

(a) Continuously measure the stage of water at a minimum of four gage sites. Three sites are currently gaged. The Licensee shall establish one additional site, using the most current USGS protocol for gage station installation, maintenance, and data collection (USGS 1982 - Measurement and Computation of Streamflow: Volumes 1 and 2, Geological Survey Water-Supply Paper 2175).

(2) Existing gage stations shall include the Klamath River below Keno Dam (#11509500), Spencer Creek above the confluence with the J.C. Boyle Reservoir (#11510000), and Klamath River below the J.C. Boyle Powerhouse (#11510700). The Licensee shall operate and maintain the gages at these sites if the gages are no longer served by the current operators.

(3) The Licensee shall install a new gage on the Klamath River J.C. Boyle Bypassed River Reach below all outlets from the J.C. Boyle Dam and above the springs at RM 225. The location for the gage shall be approved by the BLM prior to installation.

2. Instream Flow Reporting - The Licensee shall, within one year after license issuance:

(a) Provide instantaneous 30-minute real time streamflow data in cfs via remote access that is readily available and accessible to the public.

(b) Design and maintain a database, similar to the most current version of the USGS National Water Information System (NWIS) for reporting on surface water. The database shall store gage network data and streamflow tracking procedures. BLM shall review and approve the database.

(c) The Licensee shall, within two years after license issuance, submit a report for each water year (i.e. October 1st through September 30th) of streamflow data reported in cfs to the BLM. The report shall be filed with the BLM within six months of the end of each water year.

D. River Gravel Management Plan

The Licensee shall, within one year after License issuance, file to the Federal Energy Regulatory Commission (Commission) a River Gravel Management Plan (RGMP), for the J.C. Boyle Bypassed River and Peaking Reaches as specified.

The Licensee shall prepare a draft RGMP after consultation with the BLM. The Licensee shall allow a minimum of 30 days for the BLM to comment and to make recommendations on the draft RGMP before finalizing the RGMP and filing it with the Commission. The Licensee shall include with the RGMP documentation of consultation with the BLM and copies of comments and recommendations that are accommodated by the RGMP. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information. At the time the Licensee files the RGMP with the Commission, the Licensee shall submit a copy of the filed documents to the BLM.

The BLM reserves the right to require changes to the RGMP by filing modifications to the RGMP within 30 days of receipt. Upon Commission approval, the Licensee shall implement the RGMP, including any changes required by the BLM.

1. River Gravel Management Plan (RGMP) - Implementation, Monitoring, and Adaptation.

(a) At a minimum the RGMP shall include a river gravel management program to increase channel complexity and availability of spawning habitat for resident and anadromous fish. The river gravel management program will continue for the life of the License. The RGMP shall include the following components as specified:

(1) A description of how channel complexity will be provided, such that variation in channel depth, velocity, substrate, cover, and temperature at all flows is restored.

(2) Quantity of gravel to be added, such that the minimum amount to be added is 1,226 tons/year (20% of the maximum) and the maximum amount to be added is equivalent to the estimated average annual deficit of 6,134 tons/year. Quantity of gravel shall be based on estimates of ongoing reductions in sediment supply due to J.C. Boyle Dam and on the improvements in channel complexity and spawning habitat over time.

(3) Timing of gravel to be added, based on estimates of ongoing reductions in sediment supply due to J.C. Boyle Dam and on the improvements in channel complexity and spawning habitat over time.

(4) Method(s) of gravel augmentation, including, but not limited to, the following approaches:

a. Passive gravel augmentation at a logistically convenient location, allowing high flows to distribute over time;

b. Placement of discrete quantities of gravels in locations, usually riffles, where they are expected to be of most benefit, based on hydrologic and biologic considerations; and

c. Modeling of reach characteristics to determine gravel augmentation.

(5) Objectives describing how the RGMP will satisfy Klamath Falls Resource Area Resource Management Plan direction (USDI BLM 1995a), such as "Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate and character of sediment input, storage and transport." (USDI BLM 1995a, pages 7-9).

(6) Evaluation procedures, such as performance measures, that describe how monitoring results will be used for adaptation of the RGMP over the term of the License.

(b) The RGMP shall be accomplished in three phases (implementation, monitoring, and adaptation.)

(1) Implementation (Years 1 though 3): Implement the RGMP immediately upon approval by the Commission and the BLM, including any changes required by the Commission. Employ the gravel management program in accordance with permit approvals and biologically appropriate timing. In the RGMP the Licensee shall:

a. Identify specific goals of the RGMP, based on review of available habitat unit mapping and geomorphic and hydraulic studies to determine where specific riffles, glides, side channels, point bars, and floodplains will benefit from gravel augmentation. Identify numeric goals for quantifying success of: diversity in alluvial features, area of spawning and rearing habitat for different species, length of side channels, and area of potentially improved floodplain.

b. Identify the flows needed to move the size of material supplied at different sites, based on review hydraulic and geomorphic information, including slope, width, and depth of the channel.

c. Identify potential access points. Existing road access points are: 1) below the dam; 2) near the powerhouse; and 3) at the Klamath River Campground. Additional access points may be constructed or available, subject to approval by BLM.

d. Describe the location and timing of gravel augmentation, considering logistical and access constraints and legal requirements necessary to maintain water quality and aquatic and riparian habitats.

e. Identify methods for surveying for the surface area and volume of material added after gravel augmentation.

f. Develop a system for maintaining survey data including, but not limited to, timing and location of treatments.

(2) Monitoring and Evaluation (Years 1 though 7): Initiate monitoring at the time of gravel placement and continue through the life of the RGMP. Conduct monitoring to determine the effectiveness of implementation in meeting objectives of gravel augmentation, and to provide information to adapt the program. Monitoring shall include full reach monitoring and intensive site monitoring as specified:

a. Full Reach Monitoring (BLM-administered lands in the J.C. Boyle Bypassed River and Peaking Reaches):

- In the 7th year of implementation, after all gravel is placed, but before the Comprehensive Report is compiled: (1) map all locations where materials up to 250 mm are the dominant or subdominant substrate; and (2) re-map habitat unit types at similar flows, and with criteria similar to that used in preparation of the Final License Application (PacifiCorp 2004a).
- Before implementation, and in the 7th year of implementation, after all gravel is placed but before the Comprehensive Report is compiled, map point bars, side channels and floodplains, up to the estimated 100-year flood flow level.
- Annually measure and record spawning use identified within each habitat unit. Measure physical extent of spawning habitat areas used annually and any suitably sized gravel patches which are not used for spawning. Use the same methods in all years.

b. Intensive Site Monitoring (BLM-administered lands in the J.C. Boyle Bypassed River and Peaking Reaches): Select and monitor at least 20% of the length of riffle and run units. These units should be areas which are known to, or may be influenced by, gravel augmentation.

- Monitor these sites every three years or if flows exceed the five-year return frequency.
- Survey to record changes in topography and channel features based on ground surveys.
- Conduct Wolman Pebble counts, and bulk sediment sampling at each sampling period to adequately characterize the habitat unit.
- Sample invertebrate populations to identify changes in production.

(3) Adaptation (Years 7 through 9): During the seventh year of implementation, evaluate monitoring data and adapt the RGMP for the next 10-year gravel management cycle. In cooperation with the BLM, determine the effectiveness of the RGMP and determine the need for future augmentation and additional monitoring and evaluation over the following 10 years. Continue implementation, monitoring, and revision on 10-year cycles throughout the term of the license.

(c) RGMP Reporting - The Licensee shall:

(1) Submit to the BLM and the Commission, within six months after the end of each implementation and monitoring year, an annual report on the activities of the gravel management program during the previous year. The report shall include a description of the quantities of gravel added, methods used, and any monitoring data.

a. The BLM and the Commission shall have 60 days to comment on the adequacy of the RGMP, following submission of the report to the BLM and the Commission. The Licensee shall consult with the BLM on any necessary changes to the implementation and monitoring. Upon Commission approval, the Licensee shall implement the revisions.

(2) Submit to the BLM and the Commission, in the 7th year, a Comprehensive Monitoring Report of the gravel monitoring data from the previous six years.

a. The BLM shall have 90 days to comment on the adequacy of the Comprehensive Monitoring Report, following submission of the report to BLM and the Commission. The Licensee shall consult with the BLM on any necessary changes to the RGMP, as described in the adaptation phase of the RGMP. Upon Commission approval, the Licensee shall implement modifications to the RGMP from comments on the results in the report and consultation with the BLM.

E. Adaptive Management Plan (AMP)

The Licensee shall, within one year after License issuance, file to the Commission, an Adaptive Management Plan (AMP) for the J.C. Boyle Bypassed River and Peaking Reaches as specified.

The Licensee shall prepare a draft AMP after consultation with the BLM. The Licensee shall allow a minimum of 30 days for the BLM to comment and to make recommendations on the draft AMP before finalizing the AMP and filing it with the Commission. The Licensee shall include with the AMP documentation of consultation with the BLM and explanation of how BLM comments and recommendations are accommodated by the AMP. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information. At the time the Licensee files the AMP with the Commission, the Licensee shall submit a copy of the filed documents to the BLM.

The BLM reserves the right to require changes to the AMP by filing modifications to the AMP within 30 days of receipt. Upon Commission approval, the Licensee shall implement the AMP, including any changes required by the BLM.

1. The AMP shall be designed to monitor how implementation of the River Corridor Management Condition is effective in improving fish habitat quantity and quality for resident, migratory, and anadromous fish.

2. The Licensee shall report the monitoring results, and an evaluation of these results, annually to the BLM. The Licensee shall coordinate with the BLM, and the monitoring shall be consistent with other monitoring efforts (e.g., the RGMP.)

(a) The evaluation reports shall include at a minimum all relevant data collected and the Licensee's conclusions regarding the state of aquatic habitat (spawning, holding, feeding, juvenile rearing, riparian, and migratory).
(b) The report shall review the adequacy of flows for providing migration, rearing, and spawning habitat for native aquatic species; flow necessary to move spawning gravel; flow necessary achieve riparian habitat management objectives; flow to support power generation; and flows necessary to provide opportunities for recreation.

3. Within 60 days of issuance of the reports to BLM, the Licensee shall file the record of consultation and any BLM comments and recommendations with the Commission. The BLM reserves the right, after notice, comment, and administrative review, to require changes to Project operation through revision of 4(e) conditions.

Rationale

Introduction

In the J.C. Boyle Bypassed River Reach (4.3 miles from J.C. Boyle Dam to the J.C. Boyle Powerhouse), the Klamath Hydroelectric Project (Project) operations have altered the hydrologic regime. The Project has reduced flows, truncated flood flows, and reduced the seasonal flow variability. These changes have reduced scour and deposition, modified channel shape, and reduced the quality and quantity of riparian and aquatic habitat. The minimum base flow of 6 % of the mean annual flow (1560 cfs) has facilitated the encroachment of undesirable riparian vegetation species (e.g., reed canary grass), reduced recreation opportunities (e.g., whitewater boating), and transformed a major river into a small stream. The 100 cfs minimum base flow occurs about 89% of the time. Conversely, in the J.C Boyle Peaking Reach (16 miles from the J.C. Boyle Powerhouse to the slackwater of Copco I Reservoir) flows are currently hyper-variable, and change daily just below the J.C. Boyle Powerhouse from a low flow of approximately 320 cfs to either a high flow of 1,500 cfs (one turbine) or about 3,000 cfs (two turbines.) These current Project operations manage the Klamath River primarily for power production, while creating a summer whitewater boating industry. Current Project operations have also altered the Klamath River corridor including riparian and aquatic habitat.

The sections below, describe BLM management direction, the current and proposed operations, and the impacts of those operations on natural resources, recreation, and power production. There is also a description the development of the Condition and an assessment of the effects of the Condition on natural resources, recreation, and power production.

Purposes of the Reservation

The River Corridor Management Condition (Condition) addresses impacts of the Project operations on stream channel integrity, riparian habitat, and fish habitat to ensure adequate protection of natural resource values and utilization for recreation and power production. The Condition reflects multiple use and sustained yield management objectives of the BLM for the J.C. Boyle Bypassed River and Peaking Reaches on the Klamath River. The objective of the Condition is based on the Klamath Falls Resource Area Resource Management Plan (KFRA RMP) and the *Federal Lands Policy Management Act* (FLPMA 1976). According to policy

direction in FLPMA (1976), the BLM manages BLM-administered lands for multiple use and sustained yield. FLPMA states:

> "…management be on the basis of multiple use and sustained yield…"
>
> "The term "multiple use" means the management of public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; …a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and non-renewable resources, …and harmonious and coordinated management of the various resources without permanent impairment of the land and the quality of the environment with consideration being given to the relative value of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output."
>
> "The term "sustained yield" means the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use."

1. Natural Resources

The BLM reservations within the KFRA are administered according to the KFRA RMP Record of Decision (ROD). The KRFA RMP provides direction for the BLM to engage in the relicensing process: "For proposed hydroelectric projects under the jurisdiction of the Federal Energy Regulatory Commission, provide timely, written comments regarding maintenance of instream flows and habitat conditions and maintenance/restoration of riparian resources and stream channel integrity" (USDI BLM 1995a, page 16). Further direction specific to hydroelectric projects in the KFRA RMP states that a priority emphasis should be provided for: "…maintenance of instream flows and habitat conditions and maintenance/restoration of riparian resources and stream channel integrity..." (USDI BLM 1995a, page 67).

The KFRA RMP includes provisions of the 1994 Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl that is commonly referred to as the Northwest Forest Plan. Central to the Northwest Forest Plan is the Aquatic Conservation Strategy (ACS), which seeks to restore habitat and ecosystem health by maintaining and restoring aquatic habitat, restoring habitat connectivity, and maintaining flows sufficient to sustain elements of aquatic systems. The KFRA RMP states that existing hydroelectric project support facilities in Riparian Reserves should be operated "with an emphasis to eliminate adverse effects that retard or prevent attainment of ACS objectives" (USDI BLM 1995a, page 67).

According to the KFRA RMP, the BLM-administered lands along, and including, the Klamath River are a riparian reserve for fish-bearing streams. The riparian reserve for the Klamath River is "…the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of the riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of stream channel), whichever is greatest." (USDI BLM 1995a, page 13)

Table 4-1: Aquatic Resource Objectives from the KFRA RMP

Resource	KFRA RMP (USDI BLM 1995a)
1. Stream Channel Integrity	▪ "Maintain and restore the distribution, diversity and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted." (Pages 7-9) ▪ "Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species." (Pages 7-9) ▪ "Maintain and restore the physical integrity of the aquatic system, including shorelines, banks and bottom configurations." (Pages 7-9) ▪ "Maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical and chemical integrity of the system and benefits survival, growth, reproduction and migration of individuals composing aquatic and riparian communities." (Pages 7-9) ▪ "Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate and character of sediment input, storage and transport." (Pages 7-9) ▪ "Identify instream flows needed to maintain riparian resources, channel conditions, and fish passage." (Page 35)
2. Riparian Habitat	▪ "Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic and wetland habitats and to retain patterns of sediment, nutrient and wood routing. The timing, magnitude, duration and spatial distribution of peak, high and low flows must be protected." (Pages 7-9) ▪ "Maintain and restore the timing, variability and duration of floodplain inundation and water table elevation in meadows and wetlands." (Pages 7-9) ▪ "Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability." (Pages 7-9) ▪ "Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species." (Pages 7-9) ▪ "Protect floodplains and wetlands in accordance with Executive Orders 11988 and 11990" (Page 29) ▪ "Manage riparian-wetland areas to protect, maintain, or improve riparian habitat for wildlife and native plant diversity." (Page 29) ▪ "Achieve riparian-wetland area improvement and maintenance objectives through the management of existing uses, wherever feasible." (Page 29) ▪ "Prescribe management of riparian-wetland values based on site-specific characteristics and settings." (Page 29) ▪ "Include corrective measures, such as construction of erosion control structures…and control or mitigation of activities that may contribute to soil erosion and degradation of watershed condition." (Page 30)
3. Fish Habitat	▪ "Maintain and restore fisheries potential; promote the rehabilitation and protection of at-risk fish stocks and their habitat; and maintain instream flows to support riparian resources, and channel conditions." (Page 35) ▪ "Maintain or enhance the fisheries potential of streams and other waters…" (Page 35).

2. Recreation

In addition to the KFRA RMP direction for natural resources, the RMP includes provisions for managing the Upper Klamath River as a Scenic River in the National Wild and Scenic Rivers system. This 11-mile segment (RM 209.3 to 220.3) of the Klamath River below J.C. Boyle

Powerhouse has special management requirements. The designation of the Wild and Scenic River (WSR) reach of the Klamath River leads the BLM to protect "…their outstandingly remarkable values (ORV)…", to "…maintain and enhance the natural integrity of river-related values in designated and suitable river areas.", and to "…protect the free-flowing values and identified outstandingly remarkable values (recreation, scenic, fish, wildlife, prehistoric, and historic, and it's value as a Native American traditional use area)" (USDI BLM 1995a, page 45).

For the Klamath River Complex Special Recreation Management Area, which includes the WSR segment of the upper Klamath River direction is provided to "emphasize whitewater boating, fishing, and camping along the upper Klamath River" (USDI BLM 1995a, page 50).

Rationale - (A) and (B) J.C. Boyle Bypassed River Reach and Peaking Reach

A. Current and Proposed Project Operations

Current Project operations and Project operations proposed in the FLA (PacifiCorp 2004a, Executive Summary) are similar. The description and analysis below are based on the hydrologic record.

1. J.C. Boyle Bypassed River Reach Current and Proposed Project Operations

Base Flow: Current Project operations deliver approximately 100 cfs to the J.C. Boyle Bypassed River Reach (RM 220.4 TO 224.7) year-round. Large springs a short distance below the dam supply an estimated additional 220 cfs of accretion flow, such that the total streamflow in the lower portion of the bypassed reach is approximately 320 cfs for most of the year (PacifiCorp 2004d, pages 5-38 to 5-39).

Project operations divert the majority of inflow available from the Klamath River above J.C. Boyle Reservoir. The magnitude of diversion from the J.C. Boyle Reservoir ranges from 300 cfs to 2,850 cfs (PacifiCorp 2004d, 5-42). Analysis of published daily USGS flow data, using the basis that flows are 100 cfs unless there is a spill, illustrates a reduction in flow to the J.C. Boyle Bypassed River Reach (USGS gage station #11510700). Flow into the bypassed reach is at or near 100 cfs 89% of the time. In the upstream portion of the J.C. Boyle Bypassed River Reach, when water is diverted for power, current operations provide about 81% of the outflow from J.C. Boyle Reservoir to the J.C. Boyle Canal. That leaves 19% of flow to the J.C. Boyle Bypassed River Reach. By diverting the majority of inflow, the current operations of the Project manage flows primarily for power generation and reduce flows available for sediment transport and hydrologic processes that support riparian, fisheries, and aquatic species habitat in the 4.3 mile long J.C. Boyle Bypassed River Reach.

Spill: The exception to the base flow occurs during infrequent spill events when river flows exceed 2,950 cfs and J.C. Boyle Reservoir is full (PacifiCorp 2004a, Exhibit E 3.1.5.3). Changes to the base flow also occur during emergency shutdowns and emergency spillway releases (PacifiCorp 2004a, Exhibit E 3.1.5.3). As a result of current operation, flows that mimic seasonal high flows occur only when there is a spill. According to analysis of published USGS gage data from the Klamath River below the J.C. Boyle Powerhouse (#11510700) from 1990-2000, a spill occurs two to three times per year in average to wet water years.

Ramping: Ramping typically only occurs during spill events and Project maintenance or during emergency shutdowns and emergency spillway releases. There is no stream gage or flow records available to determine what existing ramp rates are in the J.C. Boyle Bypassed River Reach during spill events. There is no current License requirement for ramp rates in the J.C. Boyle Bypassed River Reach.

Flow Magnitude, Duration, and Frequency: The Klamath River below the J.C. Boyle Powerhouse USGS gage data (#11510700) from the period of record (45 years from 1959 to 2000) was used to estimate the frequency and magnitude of seasonal high flows in the J.C. Boyle Bypassed Reach. Seasonal high flows for the J.C. Boyle Bypassed River Reach are estimated by subtracting the hydraulic capacity of the J.C. Boyle Powerhouse (2,850 cfs) and spring accretions (220 cfs) from the daily streamflow values for the gage location. Flood frequency analysis (Gordon et al 1992) for this gage site reveals that due to Project diversions, the magnitude of the 1.5-year flood event has been reduced by 80%, the two-year flood event has been reduced by 51%, and the five-year flood event had been reduced by 33%. PacifiCorp analysis also shows that Project operations **reduce the magnitude of flood events** (PacifiCorp 2004d, page 5-46).

The frequency of flows at or near the base flow of 100 cfs is 89% for the period of record (45 years from 1959 to 2000). According to USGS gage records, spill events occur approximately two to three times per year in wet and average water year types and not at all in dry years. Spill events were determined by counting the number of times flows exceeded 3,200 cfs. They occur abruptly, are short in duration, and do not reflect a flow regime with seasonal variability. Thus, the **frequency of high flows** (greater than the base flow of 100 cfs) in the J.C. Boyle Bypassed River Reach would be reduced as a consequence of proposed Project operations. This conclusion is supported by the IHA analysis by Huntington, which demonstrates that the high flows of the greatest magnitude have been eliminated when compared to the without Project scenario (Huntington 2004).

The BLM review of PacifiCorp modeling results illustrate that flows in the J.C. Boyle Bypassed River Reach were only elevated above base flow (i.e. 100 cfs) for one month during an average water year (2000). When flows were increased above 100 cfs they did not exceed 2,000 cfs, even when available flows from the Klamath River above J.C. Boyle Reservoir were greater than 3,000 cfs for approximately two months (PacifiCorp 2004a, Exhibit E 3.1.5.3 and Exhibit 3-24). According to data in the Water Resources Final Technical Report (seven years between 1991-2001), the duration of annual spill periods at the J.C. Boyle Dam was greater than three months in wet and above average water years, while during below average and dry water years the duration was less than one month or did not occur at all (PacifiCorp 2004d, page 5-37). Therefore, the **duration of flood events** has been reduced by the Project operations.

Analysis of USGS gage data was used to compare the flows in the peaking reach to those in the bypassed reach to determine the reduction in **magnitude of high flows** in the bypassed reach. Compared to the J.C. Boyle Peaking Reach, the duration of high flows (greater than the average annual flow) is diminished through the diversion of available inflow to the J.C. Boyle Powerhouse. Analysis of USGS gage data for an average water year type (2000) shows that in the peaking reach, the duration of flows greater than the average annual flow was approximately five months, whereas the duration in the bypassed reach was only three months (USGS gage #11510700). In a below average water year (2001), flows were greater than the average annual

flow in the peaking reach for approximately four months, whereas in the bypassed reach flows did not exceed the base flow condition of 100 cfs at all.

2. J.C. Boyle Peaking Reach Current and Proposed Project Operations

Base Flow: The base flow to the J.C. Boyle Peaking Reach (RM 204 to RM 220.4) is approximately 320 cfs, comprised of approximately 100 cfs released from J.C. Boyle Dam plus spring accretions (PacifiCorp 2004d, pages 5-38 to 5-39). Changes to this base flow occur during peaking operations, spill events, or during emergency shutdowns and emergency spillway releases (PacifiCorp 2004a, Exhibit E 3.1.5.3).

Peaking: The Project controls a daily peaking flow pattern throughout most of the year when river inflows to J.C. Boyle Reservoir are less than the maximum hydraulic capacity (2,850 cfs) of the J.C. Boyle Powerhouse (PacifiCorp 2004d, pages 5-37). During peaking operations, this reach can have up to a ten-fold diurnal variation in flow, as discharge ranges from 320 cfs to about 3,000 cfs. More specifically, during peaking operations, river flows vary between 320 cfs and 1,500 cfs when the J.C. Boyle Powerhouse is running one turbine and about 3,000 cfs when two turbines are used (PacifiCorp 2004d, page 5-42).

When river flows are greater than about 3,000 cfs, constant generation (i.e. "run of the river") and spill occurs. The project is managed as "run of the river" for limited periods, usually during the spring (PacifiCorp 2004d, page 5-35).

Ramping: Project ramping occurs when operations require an increase or decrease in flow through the turbines for power generation. Ramping also occurs when outflow is reduced to facilitate reservoir refill or when maintenance activities require lowering Project reservoirs to access structures. In addition, there are unplanned outages which are an uncontrollable cause of Project ramping. Project start-up after planned and unplanned outages also involves ramping. Under current operations, ramp rates are restricted at the top of the J.C. Boyle Peaking Reach to nine inches per hour. Ramping occurs at this rate during peaking operations and when spill occurs at the J.C. Boyle Dam (PacifiCorp 2004d, Section 4). According to BLM review of USGS gage data, peaking operations can raise or lower the river stage downstream of the J.C. Boyle Powerhouse by 2.2 feet (river stage change from 30-minute discharge data) in a period of several hours (#11510700), resulting in rapid flow fluctuations in the J.C. Boyle Peaking Reach. Huntington (2004) documented numerous compliance violations with some ramp rates exceeding 1.2 feet per hour for up ramping and 1.3 feet per hour for down ramping.

The Project is managed as a peaking operation with daily flow fluctuations ranging from 1,000 to 2,600 cfs for nine to ten months of the year (PacifiCorp 2004d, page 5-35). Run-of-river operations occur during limited periods in late winter and spring when inflow exceeds the capacity of the two turbines in the J.C. Boyle Powerhouse. Data presented in the Water Resources FTR (PacifiCorp 2004d, 5-37) regarding the length of annual spill periods at J.C. Boyle Dam indicate that run-of-river operations, with a duration greater than three months, occur only in wet and above average water years. During below average and dry years spill is very short or does not occur. Analysis of USGS flow records downstream from J.C Boyle Powerhouse indicates that flows exceeded turbine capacity in 35 out of 45 (77%) of the water years between 1959 and 2003. The average duration of flows in excess of turbine capacity between water years 1993 and 2003 was 48 days (estimated from hydrographs derived from 30-minute streamflow data).

Huntington's IHA analysis determined the Project caused dramatic increases in median daily flow ranges (more than 1000%) and in the frequency and rates of flow change below the J.C. Boyle Powerhouse. Median hourly rates of rise and fall in flow were each increased more than 500%. Maximum rates of rise and fall in flow were increased by more than 300% (Huntington 2004).

B. Impacts of Current and Proposed Project Operations

Interactions among the biotic (e.g., vegetation and fish), hydrologic, and geomorphic components of ecosystems combine to shape the structure and function of riparian and stream systems (Kauffman et al 1997). Further, the ecological structure and function of aquatic and riparian ecosystems depends on the hydrologic regime, or pattern and quantity of water flowing through a river system (Gorman and Karr 1978, Junk et al. 1989, Poff and Ward 1990; Sparks 1992, Poff et al. 1997). Intra- and inter-annual variation in the hydrologic regime affects the dynamics among aquatic and riparian species through influences on habitat, natural disturbance, and biotic interactions (Poff and Ward 1989). Thus, modifications to the hydrologic regime can indirectly alter aquatic and riparian habitat (Ward and Stanford 1983, 1989; Bain et al. 1988).

1. Steam Channel Integrity

Bypassed Reach: According to PacifiCorp analysis of Project impacts, "…significant changes to geomorphology were observed in the J.C. Boyle bypass reach…" (PacifiCorp 2004a, Exhibit E, page 5-25). Reductions in the supply of sediment from lack of gravel recruitment due to J.C. Boyle Dam and low flows have caused changes in the stream channel. If hydrologic patterns, sediment availability, or streamside vegetation are altered, then channel morphology would subsequently adjust to these new conditions (Kauffman et al 1997). The PacifiCorp (2005) fish habitat versus flow relationships [weighted usable area (WUA) curves] indicate a change in stream structure. The WUA relationships show that geomorphic changes caused by current Project operations may have reduced the extent and quality of aquatic habitat and are impairing riparian ecological processes. These WUA curves reflect the loss of gravel point bars, benches, and spawning areas due to the loss of sediment supply; confinement due to side-cast material; more uniform bedforms; and reduced riparian width; and vegetation encroachment on the channel due to largely static flow conditions.

J.C. Boyle Dam has limited the input of sediment into the bypassed reach causing changes in channel morphology and fluvial processes, such as **coarsening of bed material** (PacifiCorp 2004d, page 6-111) and reducing the extent of active alluvial features. These changes have resulted in detrimental effects on aquatic and riparian habitats, including channel narrowing, increased bank erosion, and reduced channel migration. The J.C. Boyle Dam has blocked recruitment of sediment inputs such as gravel and small cobble. As a result, the **river bed has coarsened** as smaller gravels are transported downstream and not replaced, and larger gravels and cobbles dominate the streambed substrate. In general, below dams, with lack of sediment from flushing flows, the bedload composition becomes "armored" with material too coarse to be moved by the river, until in some cases bedrock is exposed (Collier et al 1996). The larger sized substrate that dominates these reaches is unsuitable for use by spawning fish (Kondolf and Wolman 1993).

Reductions in the magnitude and frequency of seasonal high flows have contributed to increasing the recurrence interval of flows necessary to mobilize the streambed material. Under Project operations, 1,450 cfs flows are currently needed to mobilize the streambed in the upper portion of the J.C. Boyle Bypassed River Reach. The recurrence interval of flows greater than 1,450 cfs has increased from less than one year, without the Project, to almost two years with the Project due to water diversion (PacifiCorp 2004d, page 6-134). In the lower portion of the reach, the recurrence interval of bed mobilizing flows has increased from approximately 1.5 years without the Project, to 2.5 years with the Project.

High flows that mobilize the streambed are necessary for **flushing out fine sediments**, redistributing gravel to maintain quality spawning beds (Wilcock et al 1996), providing water and nutrients to riparian areas (Stromberg 2001), and increasing the amount of rearing habitat by inundating the vegetated riparian zone.

Operation of the J.C. Boyle Canal **overflow emergency spillway** has resulted in the release of fines, sands, coarse cobble, and large boulders into the Klamath River. The J.C. Boyle overflow spillway is located approximately half way down the power canal, and has caused impacts to aquatic habitat from this segment to the reach downstream (PacifiCorp 2004a, Exhibit E, pages 5-25 to 5-26). Surveys of the area impacted by use of the emergency spill indicate that approximately 1,856,000 cubic feet of material has eroded into the bypassed reach (PacifiCorp 2004d, page 6-117). In addition, **sidecast material** from the construction of the Project canal and roads has entered the bypassed reach, causing adverse impacts, including channel narrowing (PacifiCorp 2004d, page 6-117). At one site approximately 4,800 feet upstream of the emergency spillway, road sidecast encroached into the bypassed channel, causing an undercut for nearly 400 feet on the opposite bank. This undercut has produced an estimated 276,000 cubic feet of sediment (PacifiCorp 2004d, page 6-117).

Peaking Reach: The J.C. Boyle Reservoir and Dam have reduced the **sediment supply** into the Klamath River downstream, while peaking operations from the Powerhouse have increased the substrate size of the limited sediment present in the J.C. Boyle Bypassed River and Peaking Reaches (PacifiCorp 2004d, page 6-134). Under current operations, the flow required to **mobilize the bed** has increased, while the recurrence interval of these flows has decreased (compared to the Without-Project scenario). For example, currently near the BLM campground in the J.C. Boyle Peaking Reach (RM 217.5), estimated flows of greater than 40,000 cfs would be necessary to mobilize bed materials. The reduced sediment supply coupled with frequent peaking operations has increased the average substrate size (coarsened the streambed), requiring a magnitude of higher flows greater than the largest peak flow recorded in this reach. Without the Project, approximately 5,000 cfs flows would mobilize the streambed about every two years (PacifiCorp 2004d, page 6-135). Loss of bedform features and alteration of sediment transport processes reduces the amount of productive diverse aquatic habitat (Milhous 1998).

Increased flows and reduction in the frequency of flows necessary to mobilize the streambed have reduced **channel structure and complexity** in the J.C. Boyle Peaking Reach. The channel lacks active alluvial features and is dominated by "featureless bedforms" (PacifiCorp 2004d, 6-115). This, in effect, reduces the distinction between channel features, and thus decreases fish habitat diversity (Hill et al 1991). In addition, the limited sediment supply to this reach contributes to reducing the dynamic channel structure. If hydrologic patterns, sediment availability, or streamside vegetation are altered, then channel morphology would subsequently

adjust to these new conditions (Kauffman et al 1997). This is often expressed by a simplification in stream structure (i.e. loss of pools, decreased channel sinuosity, and loss of channel diversity (Kauffman et al 1997).

2. Riparian Habitat

Bypassed Reach: Reduced flows create conditions suitable for the establishment and survival of undesirable riparian vegetation, and species such as **reed canary grass** have encroached on the stream channel (PacifiCorp 2004a, Exhibit E, page 5-149). Reed canary grass is well-suited to survive in excessively coarse substrate (areas that lack gravel and smaller sized material) and gains a competitive advantage over other native riparian species that do not establish in these conditions. Reduced base and seasonal high flows from Project operations have adversely affected the location and type of riparian vegetation in the J.C. Boyle Bypassed River Reach.

Periodic flooding of riparian vegetation is important for maintaining riparian plant species (Hill et al 1991; Marston et al 1995). Inundation from **riparian maintenance flows** provides the nutrients and substrate necessary for establishment and survival of riparian species (Kauffman et al 1997). Since current Project operations reduce the magnitude and frequency of flood flows in the bypassed reach, the upper elevation of the riparian area is reduced. This produces a narrow riparian area that is mostly defined by the 100 cfs base flow provided by the Project. Although PacifiCorp analysis only reviewed "riparian vegetation maintenance flows" for the J.C. Boyle Peaking Reach, the same analysis is appropriate to apply to the J.C. Boyle Bypassed River Reach. The relationships between seasonal high flows and riparian vegetation are similar because the general physiographic and climatic conditions between the peaking reach and the bypassed reach are comparable. According to PacifiCorp analysis, 3,300 to 5,800 cfs "riparian maintenance flows" are required in the J.C. Boyle Peaking Reach to inundate riparian all riparian vegetation (PacifiCorp 2004c, pages 3-105 to 3-106). The year-round base flow of 100 cfs (except for spills) currently provided by the Project does not produce the "riparian maintenance flows," thus reducing the width of the riparian habitat in the J.C. Boyle Bypassed River Reach (PacifiCorp 2004a, Exhibit E, pages 5-25 and 5-26).

In the upper portion of the J.C. Boyle Bypassed River Reach, the river is constrained by **sidecast material** present in the margins of the active stream channel. This material was generated during the construction of the J.C. Boyle Canal and road and continues to impact 1.5 miles of the channel. The sidecast material has constricted the channel and altered the riparian vegetation along most of the reach (PacifiCorp 2004a, Exhibit E, page 5-25). Alteration of instream flows and changes in sediment regimes can result in decreased bank stability (Rosgen 1996) and loss of riparian vegetation (Hill et al 1991). Desirable riparian vegetation (e.g., willow) does not establish and survive in the conditions created by the boulder-sized rocks comprising the sidecast. Further, in some areas this material has entered the active channel and is causing accelerated bank erosion on the opposite bank (PacifiCorp 2004d, page 6-117).

Peaking Reach: Sediment transport measurements indicate that current Project peaking operations generate flows capable of moving suspended sediment and fine-grained bedload (i.e. sand) (PacifiCorp 2004d, page 6-117). During 3,000 cfs peaking events, the bedload transport rate is approximately one ton per day, while the suspended sediment transport rate is approximately 250 tons per day. Peaking operations continue to **deplete fine sediment** from the J.C. Boyle Peaking Reach which already has a reduced supply of sand and fine sediment due to the effects of the J.C. Boyle Reservoir and Dam (PacifiCorp 2004d, page 6-44). These increased

sediment transport rates are likely to impact sediment deposition in riparian areas and aquatic habitat. Further, flow fluctuations contribute to **erosion of gravels and fine sediment** below dams by scouring the channel margins in the poorly vegetated varial zone (Brandt 2000) which further exacerbates stream bed armoring (Marcus et al 1990). This reduces the amount and distribution of riparian vegetation that would otherwise be available for aquatic life. Rearing fish, including sucker larvae and trout fry rely on low velocity channel margins. Lack of riparian vegetation in these areas limits the productivity and cover value for fish. The varial zone in the J.C. Boyle Peaking Reach is the elevation range within the active channel that is affected by daily fluctuation cycles resulting from operation of the Project facilities (PacifiCorp 2004d, page 3-101).

Flow fluctuations in the J.C. Boyle Peaking Reach have enhanced conditions conducive to the establishment and survival of undesirable riparian species, such as **reed canary grass**, and reduced the potential for establishment of other native riparian species (e.g., coyote willow.) Of the limited riparian vegetation in the varial zone, most of it is reed canary grass (PacifiCorp 2004a, Exhibit E, page 5-150). This invasive plant thrives in nutrient-rich conditions subject to frequent inundation (PacifiCorp 2004b, pages 3-112 and 3-114) and is capable of out-competing more desirable riparian species under these conditions (PacifiCorp 2004b, page 3-28). The life history of reed canary grass is conducive to disturbed conditions, such as hourly and daily flow fluctuations. The seeds respond well to mechanical disturbance (e.g., scour) (PacifiCorp 2004b, page 3-108) and the species is adapted to survive in frequently inundated coarse substrates (PacifiCorp 2004b, page 3-22).

Frequent inundation and exposure within the **varial zone** create conditions that allow reed canary grass a competitive advantage over other native riparian species. The distribution and extent of other riparian vegetation within the varial zone is limited and reed canary grass dominates the vegetation species mix (PacifiCorp 2004a, Exhibit E, page 5-150). In addition, peaking operations cause the distribution of this species to extend over a broad horizontal distance as frequent large fluctuations between high and low flows inundate and expose the varial zone (PacifiCorp 2004b, page 3-102). The current average varial zone width is approximately 48.0 feet, as interpolated from average wetted widths (PacifiCorp 2004b, Table 6.7-1) for flow fluctuations from 3,000 cfs to 325 cfs in the J.C. Boyle Peaking Reach (PacifiCorp 2004b, page 6-32). The effect of peaking operations on the varial zone differs throughout the peaking reach, depending on whether the channel is broad and "U"-shaped with terraces and point bars or confined and "V"-shaped. In narrow portions of the channel water level fluctuations would result in a greater change in stage. However, in broad lower gradient segments of the channel that have lower bank slopes, inundation or dewatering occurs over a wider horizontal area of the streambed.

Bypassed Reach and Peaking Reach: Changes in the flow and sediment regimes due to Project operations and facilities impact the potential establishment of desirable riparian vegetation. PacifiCorp analysis indicates that the J.C. Boyle Reservoir traps "…sediment which alters the amount of **fine substrate available** for establishment of riparian vegetation for some distance downstream…" (PacifiCorp 2004a, Exhibit E, page 5-148). J.C. Boyle Dam reduces the input of gravel, sand, and silt to this reach (PacifiCorp 2004a, Exhibit E, page 5-148). In addition, flow diversions and changes in the flow regime reduce the **potential for scouring and sediment deposition** of the limited material that is transported downstream of the dam (PacifiCorp 2004c, page 6-135). Since the streamflows, sediment supply, and bed mobility are reduced, the extent

of substrate appropriate for establishment of willows and other native riparian plants is decreased. Thus, the Project contributes to a **lack of willow** production (PacifiCorp 2004a, Exhibit E, page 5-102). Riparian hardwoods typically germinate and establish on "…freshly deposited alluvium in channel positions low enough to provide adequate moisture but high enough to escape scour…" (Scott et al 1993). The Project, however, maintains frequent scour conditions that do not provide alluvium over a large portion of the area where willows have the potential to establish. The inability of species like willow to compete successfully with reed canary grass under current Project conditions reflects the ability of reed canary grass to thrive under altered hydrologic regimes.

Project-related impacts on the distribution and type of riparian vegetation present in the riparian area affect the movement and migration of **wildlife species** that utilize this habitat. According to PacifiCorp, the "…patchy distribution of riparian habitats and unnatural distribution of riparian plant species may decrease the linear movement of several avian, reptile, amphibian, and mammalian species." (PacifiCorp 2004c, page 6-54) These species include a number of riparian focal species that potentially occur in the Project area (PacifiCorp 2004c, page 6-54), some of which are currently BLM sensitive species (Oregon and Washington BLM special status species list as of March, 2006). (See Table 4-2 below.) Riparian focal species use riparian habitats more often than upland habitat (PacifiCorp 2004c, page 6-54). For example, the long-term monitoring performed by the Klamath Bird Observatory indicates that riparian areas are important for breeding and during fall migration (PacifiCorp 2004c, page 6-56). Thus, the distribution of riparian habitat may have an adverse impact on the distribution of riparian-dependent bird species. Further, in the Project area there are special status herptile (e.g., Western pond turtle) and mammal (e.g., Townsend's big eared bat) species that rely on wetland and riparian habitat during some stage of their life cycle (PacifiCorp 2004c, page 5-84).

Table 4-2: Riparian Focal and BLM Sensitive Species Potentially Occurring in the Project Area.

Common Name	**Scientific Name**
Yellow warbler	*(Dendroica petechia)*
Purple martin	*(Progne subis)*
Black crowned night heron	*(Nycticorax nytcticorax)*
Western yellow-billed cuckoo	*(Coccyzus americanus)**
Song sparrow	*(Melospiza melodia)*
Oregon spotted frog	*(Rana pretiosa)* *
Willow flycatcher	*(Empidonax traillii)**
Western toad	*(Bufo boreas)* *
Yellow breasted chat	*(Icteria virens)*
Foothill yellow-legged frog	*(Rana boylii)* *
Source: Terrestrial Resources Final Technical Report, page 6-54 (PacifiCorp 2004c) * Indicates sensitive species.	

3. Fish Habitat Impacts

J.C. Boyle Bypassed River and Peaking Reaches:

Fisheries studies conducted in the Keno, J.C. Boyle Bypassed, and J.C. Boyle Peaking Reaches provide an indication of the impacts of reduced fish migration, low base flows, and the large flow fluctuations caused by the Project operations. Creel census data from Toman (1983) illustrates that numbers of trout in the J.C. Boyle Bypassed and J.C. Boyle Peaking Reaches were less than in the Keno Reach, and the size of fish was significantly larger in the Keno Reach.

This pattern was also revealed in PacifiCorp 2005a Section 3.9.3, (Addley et al 2005) which showed that trout are significantly larger and have higher growth rates in the Keno Reach than in the J.C. Boyle Peaking or Bypassed River Reaches. Oregon Department of Fish and Wildlife research from 1988-1991 (Buchanan et al 1991; Hemmingsen et al 1992; Buchanan et al 1994) and the Final Environmental Impact Statement (EIS) for the proposed Salt Caves Project (Federal Energy Regulatory Commission 1990) also noted low adult trout densities in the upper end of the peaking reach. The FERC EIS reported that trout in the upper peaking reach had relatively low growth rates and that large trout were under represented in the population age structure. The FERC EIS cited five years of investigation compiled by the City of Klamath Falls.

J.C. Boyle Bypassed River Reach:
Evidence provided in PacifiCorp studies supports the conclusion that Project operations have negative impacts on fish habitat in the bypassed reach. Specifically, the **redband trout fishery and habitat**, including food availability, fish production, and overall fish size (Addley et al 2005) are impacted by Project operations. Macroinvertebrate drift data show lower drift density in the bypassed reach compared to the Keno Reach above J.C. Boyle Dam. In the Keno Reach, drift density was 11 times higher in July and 2.4 times higher in September than drift density in the bypassed reach (Addley et al 2005, page 5). This difference in density does not include the much lower total productivity that results from less habitat area available due to lower base flow (approximately six times less flow in the bypassed reach than in the Keno Reach in June, July, and August.) The largely static flows in the bypassed reach coupled with the high proportion of low nutrient spring water may be contributing factors to low drift density and may help explain the lower fish growth and survival observed relative to the Keno Reach. The studies show that fish growth, fish survival of older age classes and fish size-at-age in the bypassed reach are less than observed in the Keno Reach (PacifiCorp 2004b). The foraging model over-predicted observed growth in the J.C. Boyle Bypassed River Reach. It would be necessary to decrease the temperature and/or observed drift density inputs to the model to match the slow growth observed in the J.C. Boyle Bypassed River Reach (Addley et al 2005). This suggests that static flows or some other habitat limitation may be affecting fish growth and survival. Similar patterns in fish population structure were reported by Beak Consulting Inc. (City of Klamath Falls 1986). Trout age distributions (few trout over three years of age and of smaller size at age) and macroinvertebrate drift data suggest that existing flow conditions limit both habitat availability and forage productivity, thus affecting redband trout growth and productivity. The evidence from recent redband trout studies (Addley et al 2005; ODFW 2003) and other previous studies (e.g. Toman 1982) suggests that the minimum inflow of 100 cfs in the J.C. Boyle Bypassed River Reach does not provide for a productive fish community in this reach.

PacifiCorp analysis illustrates that project-related flow reductions affect **fish movement and migration** (PacifiCorp 2004b, page 5-36 and 37). Historically, migrations of redband trout were documented throughout the Klamath River basin (Fortune et al 1966). Redband trout in the J.C. Boyle and Keno areas of the river exhibit a spring time migration from the Frain Ranch area (RM 217) to Upper Klamath Lake (RM 251), with a smaller migration during the fall (Fortune et al 1966, page 112). Recent passage at J.C. Boyle Dam continues to be less than 10% of that reported one year after project construction of J.C. Boyle Dam (Buchanan et al 1991). In addition, average size of redband trout passing over the ladder showed a decline in fish size over the 30 years since the dam was constructed (Hemmingsen 1997).

The fish passage and movement study conducted by PacifiCorp shows that in ten instances, downstream migrating fish pass quickly by the J.C. Boyle Powerhouse (PacifiCorp 2004b). However, information on five upstream-moving fish shows that the two longest delays observed (213 and 24 hours) occurred near the powerhouse. These fish moved into the vicinity of the powerhouse during an extended period of power generation and remained in this vicinity for up to 213 hours. This fish data represents 20% of the observations of upstream passage past the J.C. Boyle Powerhouse. These observations indicate that **flow alterations, including low minimum flow in the bypassed reach, may be affecting fish movement and migration**. During power generation, approximately 80% to 90% of the total flow is coming from the powerhouse, potentially causing a stronger attraction than the J.C. Boyle Bypassed River Reach, because of higher flows or a more concentrated homing scent, which could result in migration delay or cessation (PacifiCorp 2004b, page 5-1).

No field evaluations were conducted by PacifiCorp to evaluate **fish stranding or displacement** in the J.C. Boyle Bypassed River Reach. Although a study was requested below all dams and powerhouses (USDI 2004), no analysis of the effects from ramping due to the Project was performed above J.C. Boyle Powerhouse. However, down ramping during cessation of spill events can cause displacement, stranding, and mortality of fish and invertebrates (Cushman 1985; Hunter 1992; ODFW 2006). Evidence that stranding has been a problem due to Project operations is apparent from review of ODFW file reports, which provide accounts of numerous fish strandings and die-off events below Link River, Keno, and JC. Boyle Dams (ODFW 2006). In the bypassed reach, a fish mortality and stranding event was reported by ODFW on April 11, 1989 when inflows were reduced to the base flow of 100 cfs after an extended duration of spill. The fish stranding and die-off reported by the public and an ODFW research crew included dead and salvaged suckers, redband trout, dace, and sculpins. The event followed a 450 cfs and 520 cfs successive decrease in mean daily flow measured at Keno Dam during the previous two days. The flow in the bypassed reach was reduced by approximately 2,500 cfs or about 96% during the previous five days. Were it not for the diversion to the powerhouse, the reduction in flow volume would have been approximately 55% over the same period. Thus, the impacts of flood events are magnified in the bypassed reach because the rapid decrease from flow volume during flood events to the 100 cfs base flow causes a large relative change. Since redband spawning occurs in the bypassed reach and juvenile redband trout migrate into this reach from Spencer Creek, there is the potential for stranding after spill events, particularly in the spring when fry are present during the recession of flood flows. Additionally, high ramp rates could interfere with spawning success in this reach.

J.C. Boyle Peaking Reach:

Downstream **dewatering and desiccation of spawning habitat** were documented in studies of the J.C. Boyle Peaking Reach (City of Klamath Falls 1987). The Final EIS for the proposed Salt Caves Project (FERC 1990) noted low adult trout densities in the upper end of the peaking reach. The EIS reported that trout in the upper peaking reach had relatively low growth rates and that large trout were under-represented. The FERC EIS concluded that flow fluctuations below the J.C. Boyle Powerhouse caused chronic stress on trout and stranding of eggs, fry, and juveniles. Stress occurred from daily flow fluctuations and related changes in water temperature and water quality. These flow fluctuations caused trout to continue to seek new feeding and resting habitat while water temperature changed metabolism and feeding rates. Stage changes during hydroelectric peaking cycles may inhibit spawning (Hunter 1992; Anglin et al 2004), and can

dewater redds if spawning takes place during the high flows of the peaking cycle (Anglin et al 2004).

When peaking occurs during the middle of the summer, daily water temperature fluctuations of up to 12° Celsius occur in the J.C. Boyle Peaking Reach (City of Klamath Falls 1986; BLM 2003). In September of 2002, daily water temperature fluctuations in the peaking reach were only 2° Celsius after peaking operations were stopped temporarily, compared to fluctuations of 8° Celsius shortly before (PacifiCorp 2004). During off-peak periods of operation, the spring inflow dominates the flow volume, therefore, decreasing water temperature. However, during peaking reservoir water dominates the flow volume, therefore increasing water temperature. BLM's (2003) analysis of water temperature data during this same time period and in June 2003 demonstrates the relationship between water temperatures that occur during peaking to the water temperature resulting from the prevalence of cool spring waters from the bypassed reach. PacifiCorp water quality modeling results show that a steady flow would provide slightly lower daily maximum water temperatures and higher minimum water temperatures. In addition, water quality modeling of without-Project flow would provide even lower daily maximum temperatures and similar minimum temperatures in comparison to the existing condition (PacifiCorp 2005a, page 27; Addley 2005).

Research has shown that large daily fluctuations in temperature compromise growth and survival rates of rainbow trout (Hokanson et al 1977). The thermal effects of peaking likely compound the effects of high water temperature that are near or above the thermal tolerances for salmonids (US EPA 2003) in the peaking reach. Therefore, increases in diurnal fluctuations likely incur additional stress and energetic cost to redband trout.

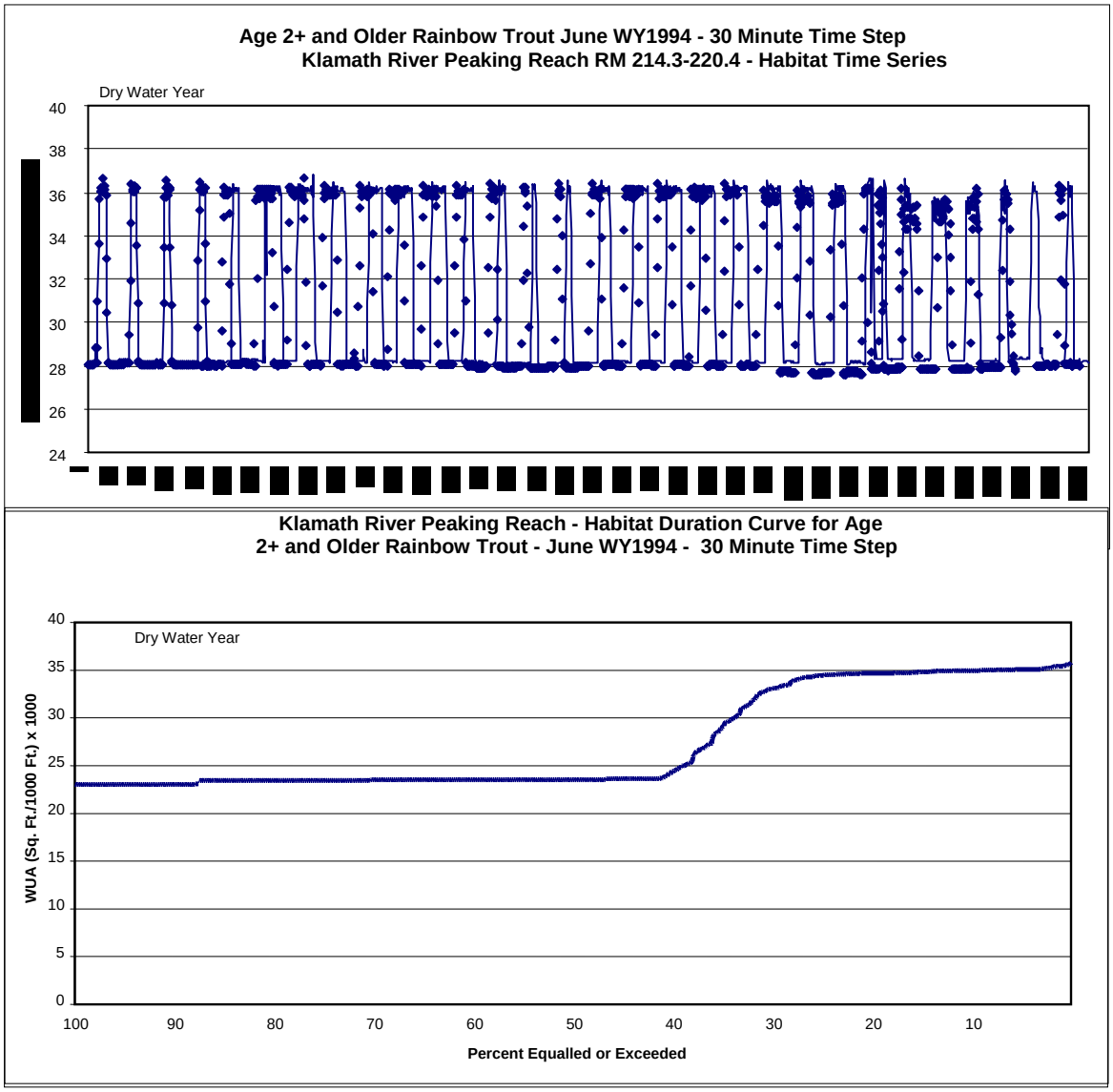
Flow fluctuations can dewater spawning beds, interfere with **spawning** at both low (when storage occurs) and peaked flows, and can result in mortality of incubating and rearing juveniles (Marcus et al 1990). Dewatering, desiccation of sucker spawning habitat, and larval stranding have been documented in the J.C. Boyle Peaking Reach (City of Klamath Falls 1986). Thus, the Project has direct effects on stranding and mortality in the peaking reach.

The effects of the Project peaking operations reduce the **amount and distribution of riparian vegetation** that would otherwise be available for aquatic life. Juvenile fish rearing habitat is generally located within ten feet of near shore areas in the varial zone. Rearing fish, including sucker larvae and trout fry rely on low velocity channel margins for escape cover and feeding. Lack of riparian vegetation limits productivity and cover values for fish (Bowen et al 2003).

The effect of peaking operations on the varial zone differs throughout the peaking reach, depending on whether the channel is broad and "U"-shaped with terraces and point bars or confined and "V"-shaped. In narrow portions of the channel water level fluctuations would result in a greater change in stage. However, in broad lower gradient segments of the channel that have lower bank slopes, inundation or dewatering occurs over a wider horizontal area of the streambed. Since a larger area across the channel and streambanks are affected by the Project, in broad portions of the reach, these areas would tend to have higher rates of fish stranding (Hunter 1992). Aadland (1993) concluded that riffle, raceway, and shallow-pool habitats were the most sensitive to flow fluctuations.

Redband trout and other native fish populations are impacted by peaking operations because these flows limit habitat area as a function of frequent low flow periods. This impact is illustrated in the time series analyses shown in Figure 4-1 (adapted from USDI BLM 2002). This data demonstrates that daily peaking operations **reduce suitable habitat** area to base flow area (approximately 320 cfs) for approximately 60% of the month of June in 1994. The 30-minute time step graph (adapted from USDI BLM 2002) illustrates the frequency and magnitude of the change to which fish and other aquatic animals must adjust on a daily basis. These graphs illustrate the change in available habitat area and the rate at which fish and invertebrates must adjust to rapidly changing conditions twice daily (USDI BLM 2002). PacifiCorp did not investigate the potential energetic cost of these flow fluctuations on trout growth and survival (Addley et al 2005).

Figure 4-1: Time Series Analysis from BLM Instream Flow Study (USDI BLM 2002).



Habitat availability information can be used to assess impacts to fish due to Project peaking operations. As Hunter (1992) points out, instream flow analysis using Instream Flow Incremental Methodology (IFIM) can be used to estimate habitat effects from flow fluctuations,

but IFIM "…is a complex and engrossing methodology that often distracts from other biological effects of hydropower development." Some of the other effects including displacement, food availability, stranding, and geomorphic impacts are discussed below.

The effects of a daily change in flow magnitude due to peaking operations are known to affect overall reach productivity and cause direct **fish mortality due to stranding** (Cushman 1985; Hunter 1992). Changes in surface water elevation cause **fish stranding** and dewatering of spawning areas during down ramping events (Cushman 1985; Hunter 1992). Studies of ramping below dams show that stranding rates increase as a function of increasing magnitude of stage change, and increasing rates of change (Bradford et al 1995). In the Bradford study, daytime stranding rates (2% bar slope) for coho juveniles in a controlled lab experiment ranged from 20% at a 2.4 inches per hour down ramp rate to 65% at an 11 inches per hour down ramp rate. Standing rates for juvenile rainbow trout were proportionally lower but exhibited similar patterns. Rapid flow increases in regulated reaches can wash out redds (Anglin et al 2005), displace fry (Hunter 1992), displace macroinvertebrates (Gislason 1985), and can incur energetic costs to fish due to frequently changing locations of available fish habitat (Anglin et al 2005). This is relevant for rearing of suckers and trout in the Klamath River because most of the habitat for rearing fish is in near-shore areas, subject to dewatering from Project peaking operations (PacifiCorp 2004b).

Physical Habitat Simulation (PHABSIM) is a method of assessing the habitat values that channels currently provide at different flows to assist with setting flow standards (Annear et al. 2004). The results of the Physical Habitat Simulation (PHABSIM) relationships provided by PacifiCorp (PacifiCorp 2005 - Flow Addendum) reflect the result of over 50 years of sediment transport impairment and regular peaking fluctuations. These changes include simplification of channel bedforms, loss of habitat diversity, loss of gravel point bars, gravel benches, and spawning areas; coarsening of the streambed; and reduced riparian productivity due to the impacts of peaking operations on the varial zone. The WUA relationships show that geomorphic changes caused by current Project operations may have reduced the extent and quality of aquatic habitat and are impairing riparian ecological processes. One explanation for why the WUA relationships do not change with changes in flow in the peaking reach is that habitat availability may be shifting with the shoreline as flow increases within the varial zone.

4. Recreation

J.C. Boyle Bypassed River Reach: According to the PacifiCorp Recreation FTR, "Project-related effects on boating in this reach have been substantial" (PacifiCorp 2004k, page 2-64). In addition "…pre-Project flows in the J.C. Boyle bypass were likely to provide flows between 1,000 and 3,000 cfs for several months each year (probably from late spring to mid summer, and then again in late fall to early winter)." Thus, the proposed operation of the Project (i.e. 100 cfs) impacts boating in this reach.

J.C. Boyle Peaking Reach: The BLM administers 21 permittees to provide commercial whitewater boating trips on the J.C. Boyle Peaking Reach of the Klamath River. The whitewater reach downstream of the J.C. Boyle Dam and Powerhouse includes 74 rapids (28 Class I, 25 Class II, 16 Class III, 3 Class IV, and 2 Class V rapids) that create a quality whitewater boating experience (PacifiCorp 2004k, Exhibit E, Page 7-29; USDI BLM 1990a, page 2-19). In the summer of 2004, a total of 4,141 visitors rafted the peaking reach. From May through October rafting visits ranged from 152 in October to 1,441 in July. The rafting use increases from May

through July and decreases from August through October, with the highest number of rafting visits in July and August (See Table 4-3).

Table 4-3: 2004 Upper Klamath Commercial Rafting Visits by Day of the Week and Month

2004 Upper Klamath Commercial Rafting Visits by Day of the Week and Month*							
	May	**June**	**July**	**August**	**September**	**October**	**Total**
Monday	11	72	157	105	28	6	379
Tuesday	38	109	110	142	0	7	406
Wednesday	7	31	32	48	0	72	190
Thursday	0	97	212	105	54	0	468
Friday	18	86	224	255	62	0	645
Saturday	72	182	517	371	161	64	1,367
Sunday	34	119	189	245	96	3	686
Total	180	696	1,441	1,271	401	152	4,141
* Data compiled January 2006.							

C. River Corridor Management Condition – Procedure for Development

As described above, Project operations do not protect stream channel integrity, riparian habitat, or fish habitat in the J.C. Boyle Bypassed River Reach or J.C. Boyle Peaking Reach. To develop the Condition, BLM utilized a multiple use resource management approach to arrive at a flow regime that would maintain and restore these resources, while also protecting recreation and providing for power production. Minimum base flows, coupled with a flow regime that includes inter-annual and intra-annual variation, are appropriate for maintaining fish habitat and riparian processes. Research also indicates that beyond prescribing a minimum flow, an appropriate flow regime based on season and water year type should be determined (Richter et al 1997; Stanford et al 1996).

To determine the flow regime to protect stream channel integrity, riparian habitat, and fish habitat, BLM used available site specific information and peer reviewed literature. The resulting flow alternatives were then analyzed with respect to impacts to recreation and power. This is achieved by implementing the direction in the KFRA RMP including the ACS objectives.

To assist in this analysis, BLM developed a Flow Management Scenario (FMS) model to assess and visualize alternatives for river flow allocation (USDI BLM 2006b). Model development was preceded by evaluating the scope and character of flow-dependent resources and the suitability of various flow regimes for specific resources. BLM used the model to run a wide range of scenarios to determine a flow regime that integrates across the BLM multiple use objectives by meeting the BLM needs for aquatic and riparian resources, while providing recreation and power generation opportunities.

The following section describes the development of four components of the Condition:

- a proportional allocation of flow to the bypassed reach and a minimum flow;
- a seasonal high flow;
- a weekly peaking opportunity; and
- ramp rate limitations.

1. Proportional Flow and Minimum Flow

The BLM began development of the proportional and minimum flow by considering the need to provide for the adequate protection and utilization of the BLM reservation, including maintenance and restoration of natural resource values and utilization for whitewater boating and power generation.

The Instream Flow Council (IFC), a nonprofit organization comprised of state and provincial fishery and wildlife agencies, recommends developing instream flow prescriptions that address five riverine components: 1) hydrology; 2) habitat; 3) geomorphology; 4) water quality; and 5) connectivity (Annear et al 2004). The IFC also notes that utilizing a percentage of unimpaired hydrology can serve as a robust and reasonable starting point in preparing a flow recommendation where site specific data is problematic (Annear et al 2004). This utilization of a percentage of unimpaired hydrology approach requires validation with site specific assessments of how biological and geomorphic processes respond to flow. This validation provides the rationale for the adaptive management component of the Condition.

The BLM coordinated with an interagency group to develop a methodology for instream flow recommendations, including fish and wildlife agencies responsible for submitting recommendations pursuant to Section 10(j) of the FPA (U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Game, and Oregon Department of Fish and Wildlife). The interagency group used the best available information to determine the flows recommended for instream habitat for fish in the Project reaches. BLM then analyzed and modified these flow recommendations to accomplish BLM multiple resource management direction.

Interagency Group

The interagency group analysis used the Tennant (1976) and Tessman (1980) method as supported by site specific information from the PHABSIM results; wetted perimeter analysis; water temperature modeling information; inundation of side channels; and an unimpaired hydrology approach. To determine the minimum base flow, the interagency group used a modification of the Tennant (1976) methodology. Instead of using the 30% of undepleted average annual flow, as recommended by Tennant (1976) for good survival conditions for most aquatic life forms and general recreation, the group used 40% of average annual flow (624 cfs). This increase in the percentage of average annual flow to 40% was made to compensate for using impaired average annual flow verses undepleted average annual flow.

To determine the proportional flow, the interagency group used a modification of the Tessman methodology (1980). Instead of using the mean monthly or mean annual flow, as recommended

by Tessman (1980), the group used 40% of the three-day average inflow. This change was made to account for local hydrologic conditions and variations in flow within the month and year.

Site specific information was also used by the interagency group to arrive at a minimum base flow recommendation. The interagency group considered using a PHABSIM analysis; however, the results were not informative for making flow recommendations because the changes in fish habitat are not responsive to changes in flow. However, the WUA curves for the J.C. Boyle Bypassed River and Peaking Reaches demonstrated that as flow is increased, habitat increases for fry, particularly as flows reach edge habitat provided by shoreline riparian vegetation.

In addition, the wetted perimeter analysis demonstrates the flows in the peaking reach should be between 700 cfs to 800 cfs to avoid the most extreme habitat dewatering and associated impacts. Further, the water temperature analysis demonstrates that the inflow to the J.C. Boyle Bypassed River Reach of 600 cfs to 800 cfs would not adversely affect thermal conditions for redband trout and anadromous fish. As a result of the analyses considered, the interagency group recommends a minimum base flow of 40% of the average annual flow (624 cfs) and 40% of the three-day average inflow, whichever is greater, to provide for fish habitat.

BLM

To achieve its objectives, the BLM minimum flow requirement differs from the interagency group, and is 30% of average annual flow (470 cfs), while the 40% proportional flow element is the same. The development of the BLM minimum and proportional flow is described in further detail below.

Minimum Base Flow: The Tennant method (Tennant 1976) is one of the first and best known percentage-of-hydrology methods. The purpose of the Tennant method is to obtain seasonally adjusted instream flow recommendations with some "…hydrological relevance for maintaining natural habitat, geomorphological, and recreational attributes of streams and rivers…" (Annear et al 2004). In his study of 11 streams in Montana, Nebraska, and Wyoming, Tennant (1976) found empirical support for his method, which recommends base flows that provide good survival conditions for most aquatic species.

The Tennant method states that 30% of unimpaired average annual flow is recommended for sustaining good survival conditions for most aquatic resources and general recreation, while 60% of average annual flow provides flows for excellent to outstanding habitat for aquatic resources and the majority of recreational uses. Tennant states that since it was derived from such a large varied dataset it can be applied successfully to streams throughout the United States (Tennant 1976). The IFC supports this claim by stating that the percentages established by Tennant were determined from data collected at a wide range of streams and do not usually require adjustment (Annear et al 2004).

According to the IFC (Annear et al 2004), the Tennant method is robust and a reasonable beginning for quantifying instream flow needs to which refinements can be made as necessary. Based on review of Tennant by the IFC (Annear et al 2004), this "…method should be associated with biological habitat needs…" at different times of year "…to be most useful in a specific region."

To determine the minimum base flow, BLM used the Tennant method and published daily flow data for the period of record (USGS Klamath River below the J.C. Boyle Powerhouse gage, #11050700, 1961-2004) to derive average annual inflow of 1780 cfs. The BLM used daily flow data for the period of record, and not unimpaired hydrology, because this represents the current condition. Inflow from springs between J.C. Boyle Dam and the gage was accounted for by subtracting 220 cfs (PacifiCorp 2004d page 5-39) from the average daily flow values, because there are no significant tributaries in this reach (PacifiCorp 2004d page 5-38 and 5-39). The average annual flow for inflow to J.C. boyle Reservoir is 1560 cfs (1780 cfs minus 220 cfs) and 30% of the average annual flow is 470 cfs.

The BLM examined the effects of a minimum flow of 30% of the average annual flow on aquatic, riparian using the current hydrology for the period of record, as well as other site specific information:

- The minimum flow was analyzed in the context of the PHABSIM results and the effects on available fry habitat;
- The wetted perimeter data was evaluated to determine the flows necessary to avoid the most extreme habitat dewatering and associated impacts;
- The minimum base flow was evaluated for the effects on side channel inundation for fish habitat.

See Section D (Effects of the River Corridor Management Condition) for a detailed discussion of the effects of the minimum base flow on natural resources.

In addition to analysis of impacts to natural resource values, BLM considered the impacts on recreation and power production in developing the minimum flow requirement. The development of the Condition included an analysis of the impacts of the flow Condition on the quality and quantity of recreational opportunities provided with the required flow regime. The development of the minimum streamflow requirement also compared the number of boating days resulting from implementation of the FLA proposed requirements, the interagency recommended flows, and the BLM minimum streamflow requirement. The number of available boating days in the peaking reach was calculated using the BLM Flow Management Scenario Model (USDI BLM 2006b) and compared to actual use data to determine a flow regime that balances the need to provide recreation opportunities with other resource values such as fisheries. The effects of the minimum base flow on rafting opportunities are analyzed in detail in Section D (Effects of the River Corridor Management Condition).

The minimum base flow of 470 cfs for the J.C. Boyle Bypassed River Reach would allow for power production except during the required seasonal high flow. When the inflow is greater than 470 cfs water would be available for power production. When inflow is between 470 cfs and 1175 cfs, all inflow above 470 cfs would be available for storage and power generation. When inflow is greater than 1175 cfs, a proportion of inflow (up to 60% of inflow) would be available for storage and power generation as describe below. The effects of the minimum base flow, including maximum ramp rates, minimum bypass reach flows, and proportional flow allocation are analyzed for their effects on power generation in Section D (Effects of the River Corridor Management Condition).

Proportional Flow: According to the IFC review (Annear et al 2004) of the Tennant method, average annual flow does not often reflect seasonal patterns in hydrology. Further, this review states that the intention of this method was to use different flows at different times of year to

follow the natural hydrograph to the extent possible. Hence, the Tennant method is appropriate for determining the minimum base flow requirement (for example see Armstrong and Parker 2003) while the Tessman (1980) approach is effective in addressing seasonal high flows through a proportional flow allocation (e.g., Maunder and Hindly 2005; Estes and Osborne 1986).

Tessman modified Tennant's approach to be more responsive to systems with a large amount of natural variation by calibrating for local hydrologic and biologic parameters, including monthly variability. By combining annual flow statistics with monthly variability, the Tessman approach provides inter-annual variation. The Tessman approach uses a 40% proportional flow in relation to mean annual flow and mean monthly flow. The 40% of flow is needed to account for large fluctuations in flow during different months of the year (Tessman 1980). The Condition utilizes this percentage and applies it to the inflow to J.C. Boyle Reservoir. To account for local hydrologic conditions, variations in flow within the months and year, and the storage capacity of J.C. Boyle Reservoir, the Condition refines the Tessman approach to require 40% of the inflow, as determined from the average flow of the previous three days. When inflow exceeds 1,175 cfs (1,175 cfs * 40% = 470 cfs), 40% of the inflow would be provided and flow would increase above the minimum base flow requirement. Thus by applying the Tessman approach, flows are increased above the minimum base flow and reflect the seasonal variability. Inter-annual variation is needed for establishing and maintaining riparian vegetation, including disturbance regimes from high and low water year extremes (Richter 1986).

The modification from the average annual or average monthly flow to the average flow of the previous three days represents a change from the traditional "flatline" Tennant flow requirement and provides intra-annual variability. The Condition uses a smaller time step than Tessman (three days instead of monthly or annually) to provide for more frequent variations, facilitate Project operations, and accommodate the relatively small storage capacity of the J.C. Boyle Reservoir. By providing 40% of flows averaged from the previous three days, seasonal patterns based on water availability and appropriate amounts of inter-annual variation are incorporated.

2. Seasonal High Flow

In addition to the minimum base flow and proportional flow, providing a seasonal high flow to the bypassed reach sufficient to mobilize and distribute sediment is needed to support riparian and geomorphic processes. An annual flushing flow is often required to clean and redeposit gravel to provide quality spawning habitat (Wilcock et al 1996). To achieve desired ecological effects, the seasonal flow should be of adequate duration and frequency to mobilize and redistribute sediments, flush fine sediments from spawning beds (Wilcock et al 1996), deposit riparian plant seeds and fine sediment (Tessman 1980), wet the riparian area at the beginning of the growing season (Junk and Wantzen 2004), and provide a disturbance regime for germination of riparian plants (PacifiCorp 2004c, page 3-107; Hill et al 1991; Hansen et al 1998).

The Condition requirement for the timing, magnitude, and duration of the seasonal high flow was determined based on needs of riparian vegetation on BLM-administered lands in the bypassed and peaking reaches. The timing of the flushing flow (once 3,300 cfs is available between February 1st and April 15th) coincides with the early part of the growing season and germination of riparian species. The seasonal high flow duration of one week was derived from analysis of seasonal high flows at the USGS gage below Keno Dam (#110050500). One week was the minimum duration of seasonal high flows over 3,300 cfs (analysis of USGS gage records from

1990 to 2004). Flows over 3,300 cfs after February 1st, occurred in six of the last 15 years. The duration of continuous flows over 3,300 cfs averaged 28 days with a maximum 78 days and a minimum of seven days. The gage data suggests that the seasonal high flow would only occur in relatively wet years.

According to PacifiCorp analysis, in the peaking reach, 3,300 cfs to 5,800 cfs "riparian vegetation maintenance flows" are required to inundate riparian vegetation (PacifiCorp 2004c, page 3-105 to 3-106). A flow of 3,300 cfs corresponds to a return interval of about 1.5 years at the Klamath River below the J.C. Boyle Powerhouse gage (BLM analysis of USGS #11510700). Flows with a return interval of 1-2 years are often the flows necessary to support channel maintenance processes such as sediment transport and streamside vegetation (Gorden 1992). This return interval flow frequently corresponds to the "bankful dishcharge" which is the flow that fills the stream to its banks and is often assumed to control the form of alluvial channels (Gorden et al 1992; Rosgen 1996)". The 3,300 cfs seasonal high flow derived from the peaking reach data is also applicable to the bypassed reach. Flows above 3,300 in the bypassed reach would increase the frequency and magnitude of sediment bed mobility in the bypassed reach (PacifiCorp 2004d, page 6-134). Bed mobilization is needed to maintain the quality and quantity of spawning habitat (Wilcock et al 1996).

3. Weekly Peak

The Condition requires the Licensee to minimize peaking to no more than once per week targeted on weekend days during the summer months (May 1st to October 31st). The Condition reduces the impacts on aquatic and riparian resources, while providing for whitewater boating and power generation. By reducing the frequency of daily peaking events, impacts to fish habitat are expected to decrease. The peaking operations flow regime in the Condition integrates requirements for recreation, power generation, and aquatic resources, such that a quality whitewater boating opportunity is possible and power can be produced, while the effects of peaking on fish are reduced.

To accomplish objectives to provide for whitewater boating, the Condition allows peaking operations from 1,500 to 3,000 cfs a maximum of once per week with a priority set for Saturday, Sunday, then Friday from May 1st to October 31st. According to the PacifiCorp Recreation Flow Analysis for the J.C. Boyle Bypassed River Reach and the Hells Corner segment of the Klamath River, 1,500 cfs would be near the optimal level of flow for whitewater boating. Fifteen hundred cfs would allow for commercial whitewater rafting trips through both of these reaches. The analysis also indicated that 3,000 cfs would be the maximum flow to allow for a quality whitewater boating opportunity (PacifiCorp 2004k).

The season of use and priority days for peaking operations necessary for whitewater boating are based on commercial rafting use reports compiled from 1985 to 2005 (USDI BLM 1985-2005). The reports illustrate that the highest use days are Saturday, Sunday, and Friday, and that the rafting season extends from the beginning of May to the end of October. For example, during the summer of 2004, 66% of rafting visits were on Friday, Saturday, or Sunday. In addition, from May through October rafting visits ranged from 152 in October to 1,441 in July. The rafting use increases from May through July and decreases from August through October, with the highest number of rafting visits in July and August. (Refer to Table 4-3 above.)

4. Ramping Rates During Controlled Events

The Condition requirement for ramp rate limits was determined by evaluating relevant literature, site specific studies by PacifiCorp, and relevant site specific reports, and information provided by Oregon Department of Fish and Wildlife and others. Additionally, a comparison of existing ramp rates was evaluated against a relatively unaltered hydrograph in a major tributary to the Upper Klamath River to better understand the flow variability conditions under which native species likely evolved. (See Huntington 2004 and discussion of his findings below.)

The Condition requirement for ramping rates limits up or down ramping to two inches per hour for the bypassed and peaking reaches except during uncontrolled events and implementation of the seasonal high flow. This rate is considered adequate to limit stranding mortality for fisheries and other aquatic organisms as a function of rapid changes in vertical stage and rapid dewatering of the channel bed when fry are not present (Hunter 1992). Hunter (1992) noted that stranding of salmonid fry can occur at ramping rates as low as one inch per hour. He recommends no artificial ramping when Chinook fry are present because they are more vulnerable to ramping than other salmonids.

PacifiCorp evaluated stranding potential downstream of the bypassed reach however, results provided little insight to potential stranding or displacement effects because fish density was very low under current Project operations (PacifiCorp 2005). Findings from the PacifiCorp study evaluating potential fish stranding and entrapment in the peaking reach (PacifiCorp 2005) are consistent with the findings of other stranding and entrapment studies that report difficulty in detecting stranded fish due to predation and burrowing (Hunter 1992). PacifiCorp surveys indicated low numbers of stranded fish and low numbers of fish present in the study area. Thus, it is expected that stranding observations would be commensurate with fish density (Hunter 1992). In addition, there were no reliable fish population estimates and no application of a lower ramp rate to assess the effectiveness of a lower ramp rate in preventing fish stranding. Although the PacifiCorp study did not have the data needed to analyze an adequate ramp rate, fry and juvenile stranding rates are substantially reduced when ramping rates are equal to or less than two inches per hour (Hunter 1992). The results of the PacifiCorp study show that ramp rates attenuate in a downstream direction. A ramp rate below the powerhouse (RM 219.7) of about nine inches per hour attenuated to about five inches per hour at Frain Ranch (RM 214.3) and an eight inch ramp rate at the powerhouse attenuated to about a three inch per hour ramp rate near Shovel Creek (RM 206.3). If attenuation at lower ramp rates is proportional to attenuation at higher ramp rates, then a two inch ramp rate would be attenuated to about 1.1 inches at Frain Ranch and about 0.75 inches per hour at Shovel Creek.

Laboratory (Bradford et al 1995) and field studies (e.g., Anglin et al 2005) show that ramp rates over two inches per hour can cause harm to aquatic species, including rainbow trout fry, salmonid eggs, and spawning success. Studies of ramping below dams show that stranding rates increase as a function of increasing magnitude of stage change, and increasing rates of change (Bradford et al 1995). In the Bradford study, daytime stranding rates (2% bar slope) for coho juveniles in a controlled lab experiment ranged from 20% at a 2.4 inches per hour down ramp rate to 65% at an 11 inches per hour down ramp rate. Stranding rates for juvenile rainbow trout were proportionally lower but exhibited similar patterns.

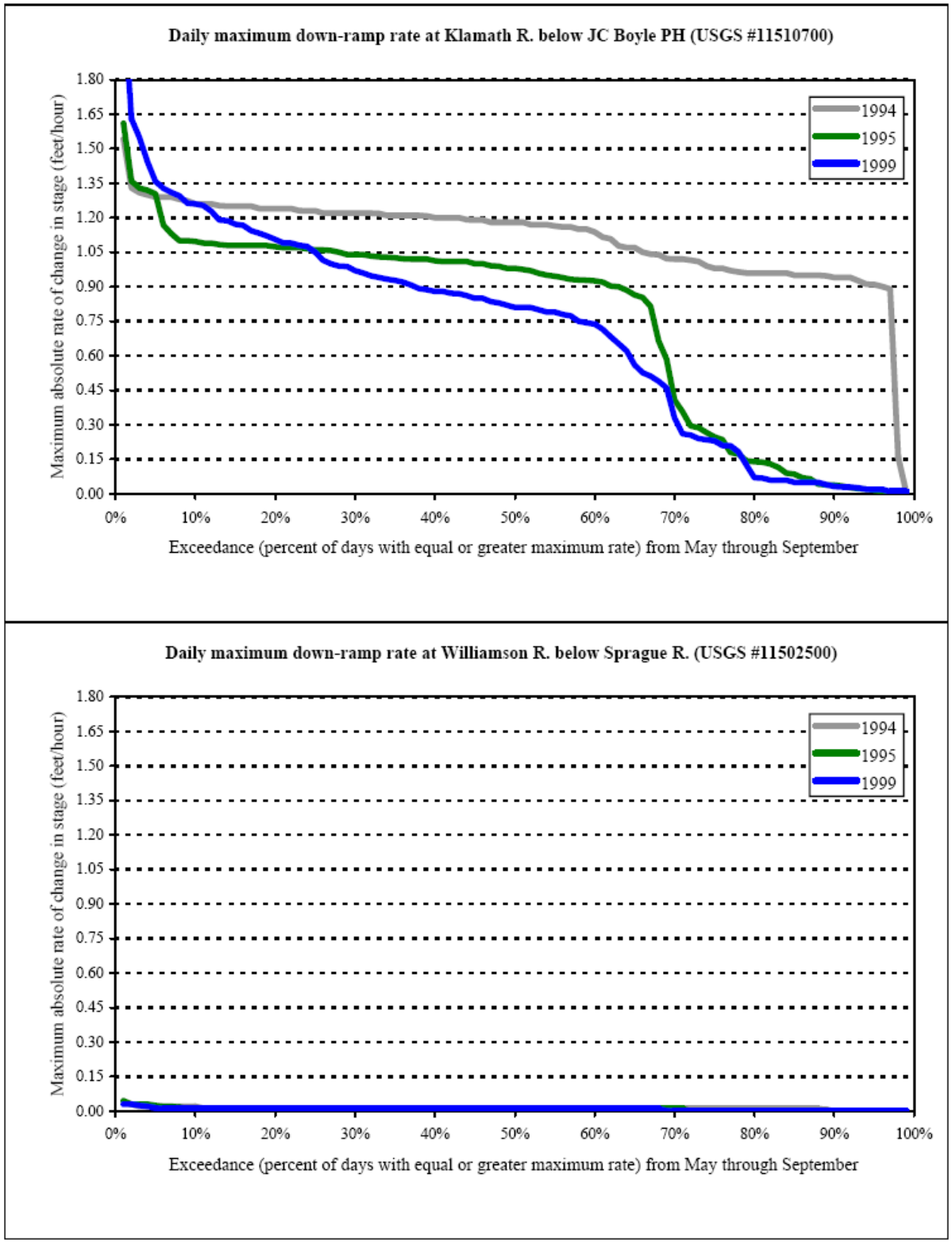
In addition to an analysis of existing studies, the ramp rate limit for the Condition was determined through evaluation of the Huntington analysis, comparing the J.C. Boyle Peaking Reach (2004) to the Williamson River. This analysis was used to determine what the appropriate ramp rate would be for a similar river system with no peaking operations. Huntington (2004) compared stage change rates on the Williamson River to stage change rates at the J.C. Boyle Peaking Reach below the Powerhouse gage (USGS #11510700), using the period from May to September. The Williamson River hydrograph is comparable to the Klamath River because of the presence of upstream springs, upstream irrigation diversions, and it is located in the same subbasin. The Williamson gage is likely the best-available source of information on the approximate levels of up ramp and down ramp rates that might be seen at the gage site below the J.C. Boyle Powerhouse (USGS #11510700) if no water was diverted for Project operations. The data from the Williamson gage likely represents the rate of stage change under which the Klamath basin aquatic species evolved.

Results of stage-change analysis for the Williamson River gage site below Sprague River are provided in Figure 4-2 (Huntington 2004). Daily maximum rates of increase or decrease in stage at the Williamson River site are approximately two inches during May to September 1994, 1995, and 1999, as compared to approximately 2.2 feet at the gage below J.C. Boyle Powerhouse (USGS #11510700) during the same years. This was a period after peak runoff had occurred at both sites and also a period during which small juvenile fish in the river system would have been relatively vulnerable to stranding or trapping by rapid flow reductions (PacifiCorp 2004b, page 6-3).

In determining a ramp rate for the Bypassed and Peaking reaches, the PacifiCorp findings and relevant literature was used to determine a rate that balanced aquatic species concerns but still provides for recreation and power generation. Ramp rates were modeled using the Flow Management Scenario Model (USDI BLM 2003) to better understand the relative difference between the ramp rates proposed by the Licensee and those more protective of aquatic resources.

The ramp rate limits provided in the Condition, based on recommendations in Hunter (1992), are designed to reduce but not eliminate stranding and displacement of trout and other aquatic organisms. Reducing the rate of water level change would provide additional time for fish to adjust to spatial changes in habitat availability potentially reducing energetic costs and vulnerability to predation.

Figure 4-2: Exceedance values for daily maximum rates of decline (down ramp) below the J.C. Boyle Powerhouse (USGS Gage # 1150700) and on Williamson River (USGS Gage # 11502500) during 1994, 1995, and 1999 (Huntington 2004, Figure 6, page 16).



D. Effects of the River Corridor Management Condition

The Condition would alter the current Project flow regime from a low static base flow (except for spills) in the J.C. Boyle Bypassed River and Peaking Reaches to a proportional flow with a higher overall minimum base flow. The Condition increases the base flow in the J.C. Boyle Bypassed River Reach from 100 cfs to no less than 470 cfs when the inflow to the J.C. Boyle Reservoir is at least 470 cfs. The Condition requires the Licensee to provide 40% of the inflow at the upstream portion of the J.C. Boyle Bypassed River Reach, with a required minimum base flow of 470 cfs. When 470 cfs is not available, then an amount no less than the inflow from the Klamath River above J.C. Boyle Reservoir is required to be released to the bypassed reach. This provision of the Condition addresses water availability, especially for dry years, and variability in the annual flow regime. Thus, the Condition requires an overall increased base flow from the current condition and flows that are more reflective of seasonal events, including high and low flows (Tessman 1980; Annear et al 2004).

The modeled flow regime provided to the bypassed reach is illustrated for the year 1994 (dry), 2000 (average) and 1998 (wet) (water year types are based on BLM 2002) in Figure 4-3 (Parts A, B, and C). These figures illustrate the intent and approximate outcome of the flow requirements, including the one week diversion suspension for seasonal high flow.

For the dry year (1994), a higher proportion (66%) of the available water supply is bypassed because the 470 cfs minimum flow requirement would provide between 40% and 100% of the total inflow for much of the year. In 1994 (Figure 4-4, Part A), inflow never exceeds 3,300 cfs, and therefore, no seasonal high flow requiring suspension of diversion is provided. However, inflow drops below 470 cfs in the summer and therefore no diversion is provided during that period.

In total, 46% of the annual flow is provided to the bypassed reach in the year (2000). When the Condition was modeled with FMS using data from 2000, flows to the bypassed reach were maintained above the minimum flow (i.e. 470 cfs) for all months. Further, when the water availability increased from January through May, flows through the bypassed reach reflected this change (See Figure 4-4, Part B). During the year 2000, an inflow event of greater than 3,300 cfs occurs between February 1 and April 15, and therefore a seasonal high flow occurs.

In 1998 (wet year), the BLM flow condition provides 47% of the annual flow to the bypassed reach. In this year the seasonal high flow is illustrated because inflows over 3,000 cfs occur (Figure 4-4, Part C).

Figure 4-3 (Parts A, B, and C) illustrates that minimum base flows are provided except during the summer of very dry years. Flows in the bypassed reach are generally proportional, as Tessman (1980) recommends, and reflective of inflow to J.C. Boyle Reservoir.

The effects of the flow requirements on a weekly peaking cycle were also modeled using the BLM Flow Management Scenario Model (USDI BLM 2006b). Examples of the flow allocations hydrographs are provided in Figure 4-4 for a dry year (1994), an average year (2000), and a wet year (1998). A weekly peaking cycle provides rafting opportunities and flows for power generation except in July and most of August in the dry year (1994). Like all models, FMS

makes some simplifying assumptions; see the model documentation submitted on the CD along with this filing for details (USDI BLM 2006b).

Figure 4-3A: FMS Modeled Flow Regimes for the J.C. Boyle Bypassed River Reach for a Dry Water Year (1994)

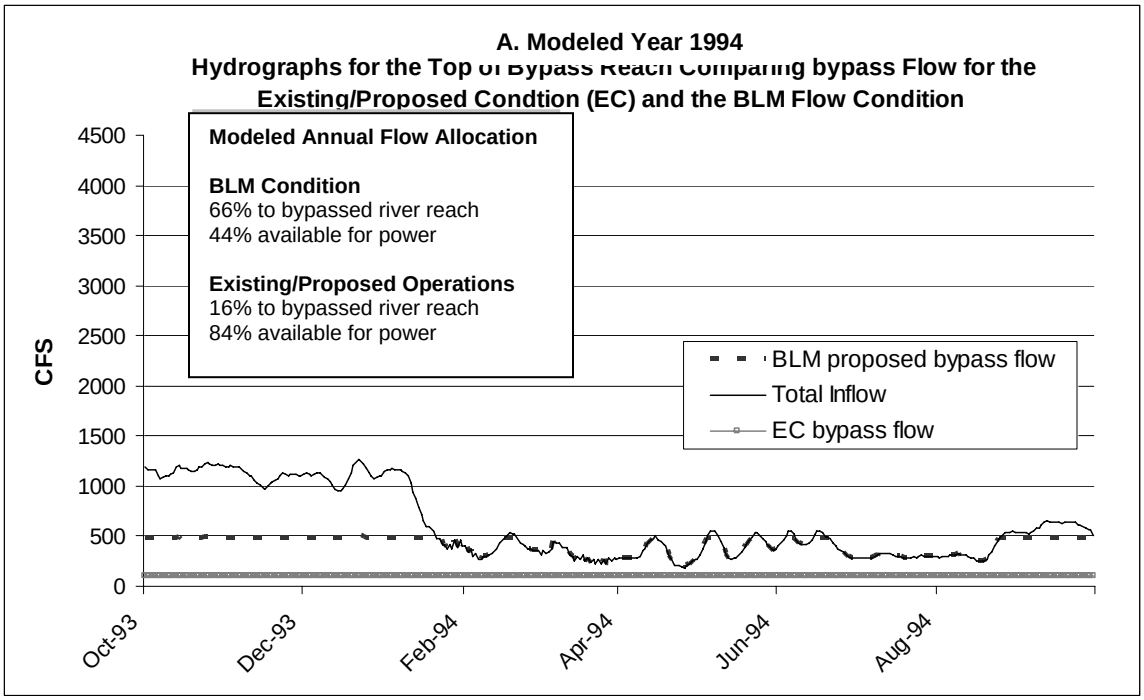


Figure 4-3B: FMS Modeled Flow Regimes for the J.C. Boyle Bypassed River Reach for an Average Water Year (2000)

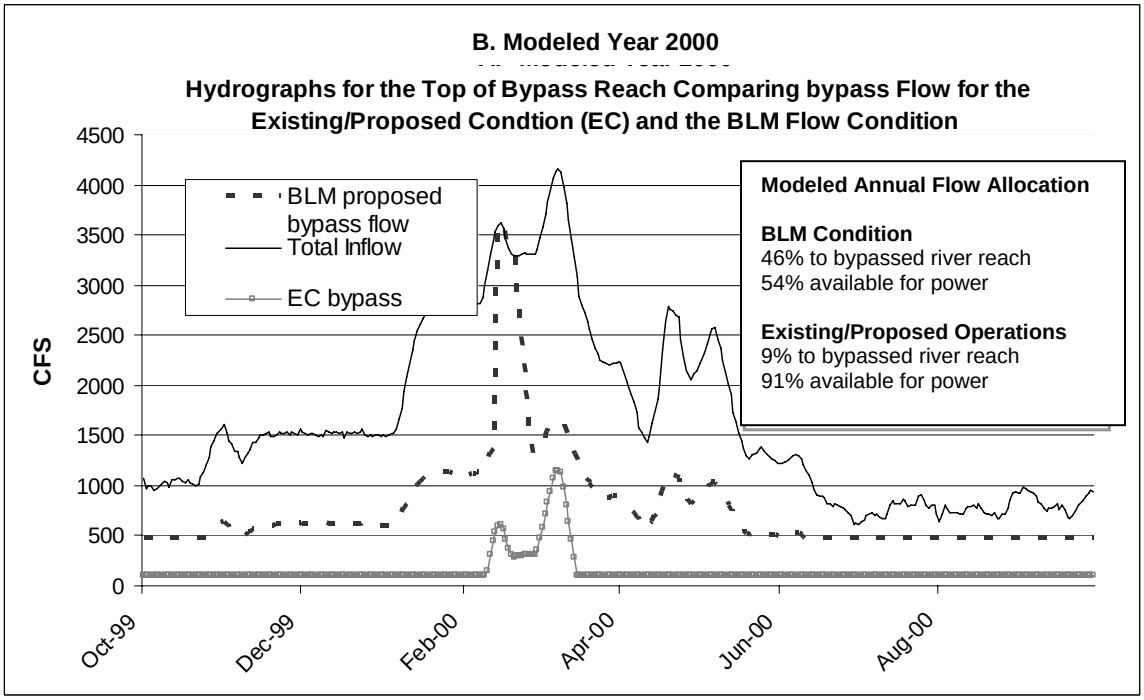
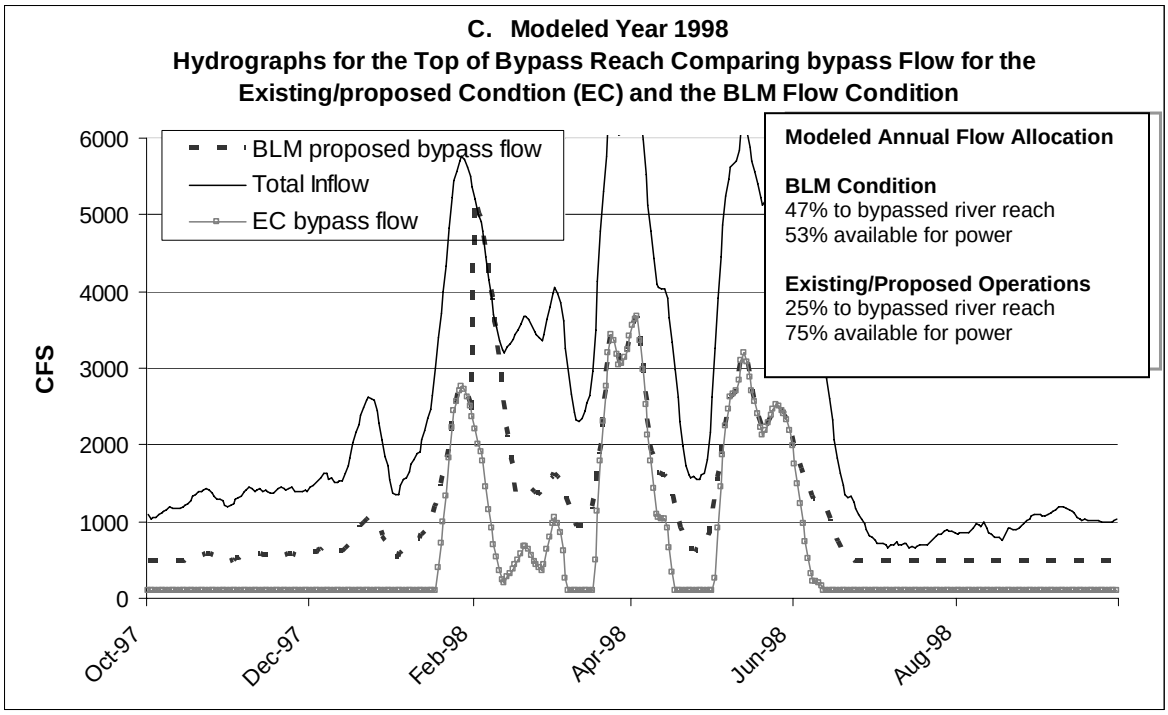
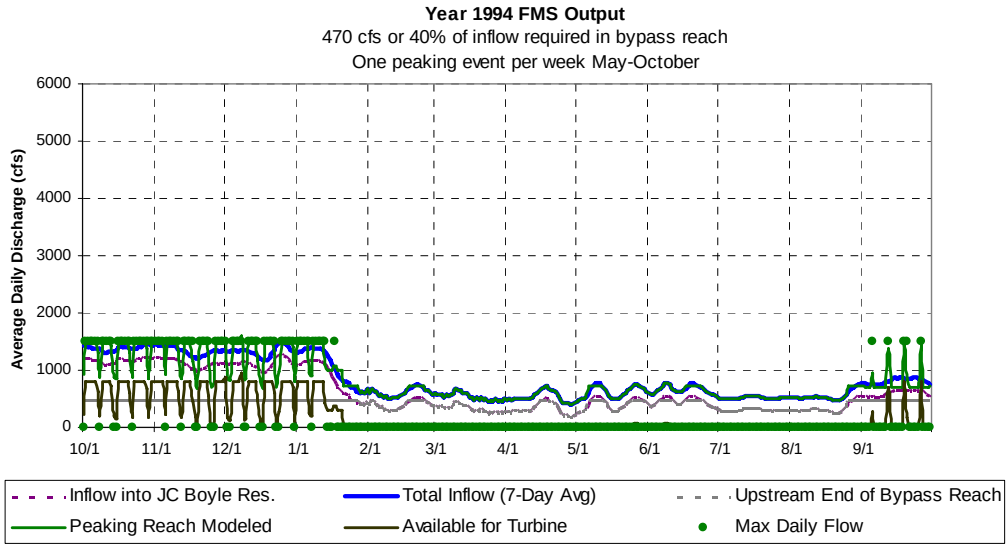


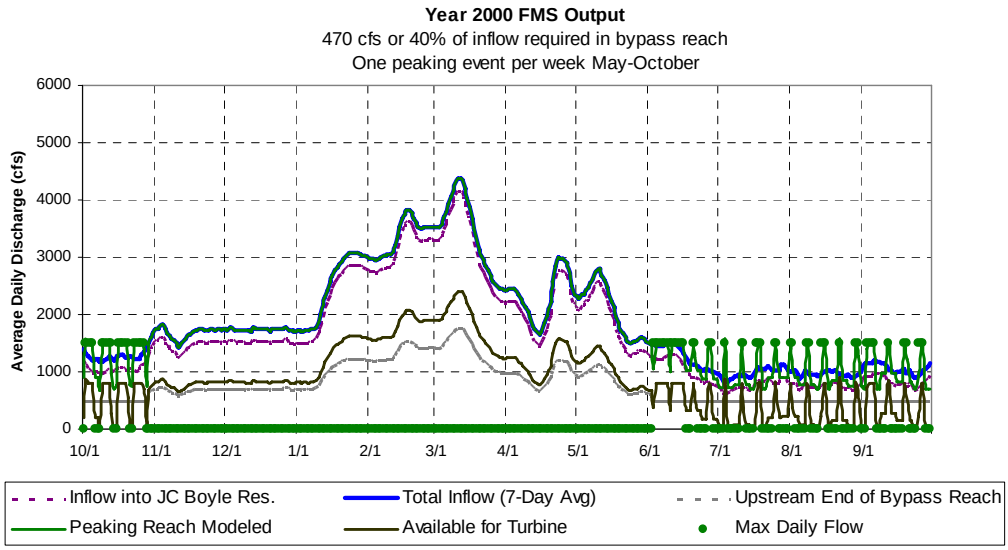
Figure 4-3C: FMS Modeled Flow Regimes for the J.C. Boyle Bypassed River Reach for a Wet Water Year (1998)

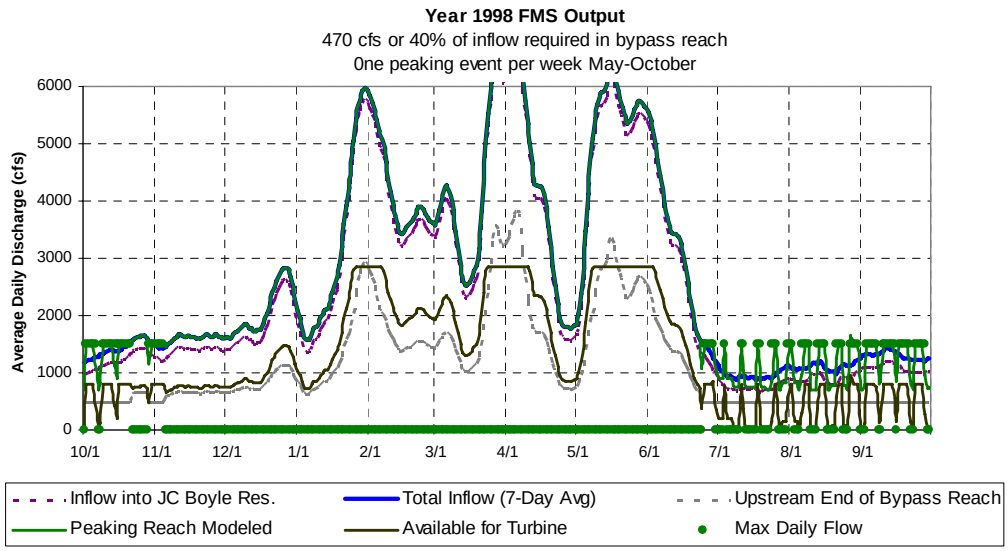


[Figures 4-3A, 4-3B, and 4-3C above illustrate modeled J.C. Boyle Bypassed River Reach Hydrographs showing Minimum Streamflow Condition bypass flows for Existing Condition (EC) compared to the BLM Condition flow requirement (470 cfs minimum or 40% of inflow) and seasonal high flow for the year 1994 (A), 2000 (B) and 1998 (C), a dry, average, and wet year respectively. Hydrographs are derived from the Klamath River below the J.C. Boyle Powerhouse gage data (#11510700) minus 220 cfs to account for spring inflow and smoothed to 7-day running average for visual presentation. Data from USDI BLM 2002.]

Figure 4-4: Flow allocations hydrographs (dry year-1994, average year-2000, wet year-1998).







1. Stream Channel Integrity

Impacts of the Condition in the Bypassed and Peaking Reaches:
In addition to the minimum base flow and proportional flow, an un-diverted seasonal high flow for one week to the bypassed reach is expected to mobilize sediment in the stream bed and distribute this sediment in a manner beneficial to riparian and geomorphic processes. An annual seasonal high flow would support high quality spawning habitat by redistributing gravels and flushing fine and embedded sediments (Wilcock et al 1996). A seasonal high flow of at least one week in duration would increase stream channel complexity and desirable bedform characteristics. Seasonal high flows are needed to maintain stream channel and riparian processes that provide fish habitat (Hill et al 1991).

2. Riparian Habitat

Impacts of the Condition in the Bypassed Reach:
The proportional flow requirement provides for the receding flows during the growing season necessary for establishing riparian vegetation on terraces on BLM-administered land. Flows needed to restore frequent inundation of the riparian vegetation and nutrient cycling processes rely on gradually receding flows during the growing season (Hill et al 1991; Stromberg 2001). The requirement of a 40% proportional flow with a 470 cfs minimum base flow would provide a more frequently inundated riparian area, thus increasing the amount of aquatic habitat provided by submerged and inundated riparian vegetation. The width of the riparian area would be expected to increase as sediments are deposited in the active channel. The Condition would improve the riparian and fish habitats by providing flows more similar to those in which desirable riparian vegetation and aquatic species are adapted. Flows occurring in the bypassed reach that are below 470 cfs would allow for some establishment of desirable riparian vegetation below the base flow waterline. This riparian habitat would provide cover and feeding areas for early life stages of rearing fish.

Due to the lack of data provided by PacifiCorp for the J.C. Boyle Bypassed River Reach as previously requested (USDI 2004), BLM evaluated other relevant studies (e.g., Hill et al 1991 and Stromberg 2001) to assess the effects of the Condition on riparian habitat. This literature shows that there would be an increase in riparian habitat based on an increase in frequency and magnitude of the seasonal high flow. The Condition would provide the increased base flow, proportional flows, and seasonal high flows needed for protection of the BLM reservation and so provides for the attainment of the KFRA RMP ACS objectives.

Impacts of the Condition in the Peaking Reach:
The Condition would provide the increased base flow and seasonal high flows during the growing season necessary for establishing riparian vegetation on terraces on BLM-administered land. The requirement of a 40% proportional flow, with a 690 cfs minimum base flow (470 cfs minimum flow and 220 cfs spring accretions), would inundate more of the riparian area, thus increasing the amount of aquatic habitat provided by submerged and inundated riparian vegetation. The width of the riparian area would be expected to increase as sediments are deposited in the active channel. The Condition would improve the riparian and fish habitats by providing flows more similar to those in which desirable riparian vegetation and aquatic species are adapted.

The Condition requires a reduction in the frequency of peaking events to once per week in the summer months (May 1st-October 31st). Reduced frequency or timing of inundation in the upper varial zone (PacifiCorp 2004d, page 3-101) is expected to reduce reed canary grass in these areas (PacifiCorp 2004a, Exhibit E 5-150). Since reed canary grass is adapted to survive in disturbed conditions subject to frequent inundation (e.g., hourly and daily flow fluctuations), reducing the frequency of peaking events is expected to reduce reed canary grass in the upper varial zone.

Impact of the Condition in the Bypassed River and Peaking Reaches:
A seasonal high flow of at least one week in duration would increase stream channel complexity and desirable bedform characteristics. Seasonal high flows are needed to maintain stream channel and riparian processes that provide fish habitat (Hill et al 1991). By requiring that the seasonal high flow be provided after the last day of February, this flow is likely to occur during the early part of the growing season.

3. Fish Habitat Quantity and Quality

Impacts of the Condition in the Bypassed Reach:
The Condition would increase fish habitat quantity and improve habitat quality as riparian and geomorphic processes are improved. A flow that reflects seasonal variability, including flood events, would restore ecological functions necessary for the protection of the BLM reservation and provides for the attainment of KFRA RMP fish habitat objectives and ACS Objectives. The results of PacifiCorp studies focusing on fish production (Addley et al 2005; PacifiCorp 2004b) demonstrate that restoring base flows and seasonal high flows to the bypassed reach would be necessary to maintain and improve fish habitat.

The Licensee conducted a PHABSIM analysis for the bypassed reach but the results appear to be unresponsive to changes in flow. The PHABSIM analysis conducted by the Licensee in the Klamath River reflects the results of a highly modified flow alteration and impacts on channel shape in the J.C. Boyle Bypassed River Reach. The Weighted Usable Area (WUA) relationships for rainbow trout presented by PacifiCorp in their April 2005 addendum to the instream flow study are remarkably flat, indicating that microhabitat is unresponsive to changes in flow. Therefore, the current PHABSIM relationships are not informative and have limited utility in determining flow needs for most life stages of trout and sucker.

The WUA do curves show that there is minimal habitat for trout fry and sucker larvae (low percent of total area for the entire range of flows), and therefore may be a limiting factor for cohort recruitment in the bypassed reach. The WUA estimates for the bypassed reach suggest that trout fry and sucker larvae habitat availability increase with increasing flows up to about 800 cfs, because more edge habitat is available at higher flows (PacifiCorp 2005 - Instream Flow Addendum Report). Since more riparian vegetation is inundated at higher flows, more trout fry and sucker larvae habitat would be available under the flow proportional flow regime required by the Condition. Figure 4-4 (above) shows that 800 cfs is available to the bypassed reach during May and June of the average and wet years when these life stages would likely be present and a proportion of the inflow would be added to the base flow.

The Condition provides for “riparian vegetation maintenance flows” which would inundate all riparian vegetation (PacifiCorp 2004c, pages 3-105 to 3-106) and seasonal high flows which

would redistribute gravel and fine sediment to edge habitat along the channel margins. Cumulatively, with the addition of gravel (See Section D – RGMP of the Condition), these processes would lead to an increased extent and improved quality of riparian vegetation, thus increasing habitat availability for critical life stages (trout fry and sucker larvae) of native fish.

Increasing the minimum base flow above the existing condition (100 cfs) results in more suitable habitat availability for trout fry. According to the PacifiCorp WUA curves for redband trout, a 470 cfs minimum base flow allows for a 32% increase in fry suitable area, over the existing minimum flow (See Table 4-4).

Table 4-4: J.C. Boyle Bypassed River Reach Percent of Optimal Fry Habitat Availability for Existing Instream Flow Requirement and the BLM 4(e) Base Flow Requirement.

J C Boyle Bypassed River Reach			
	Flow (cfs)	**% of Area**	**% of Maximum**
PacifiCorp Existing Condition	100	6.1%	65.8%
BLM 4(e) Minimum Flow	470	6.4%	86.8%
Flow values are the releases at J.C. Boyle Dam and do not include spring accretions which were weighted for flow accretions at each habitat simulation transect (PacifiCorp 2005 - Instream Flow Studies Addendum Report)			

Side channels are often characterized by slower velocities and provide for high quality microhabitat for rearing and spawning fish (Bowen et al 2003). PacifiCorp (2004b) identified nine side channels below the J.C. Boyle Powerhouse, but did not identify any in the J.C. Boyle Bypassed River Reach. BLM identified six side channels in the bypassed reach using aerial photographs. It is expected that base flow increases approaching 700 cfs would result in water flowing in most of the bypassed reach side channels, and that the proportional flow allocation would further inundate side channels during critical spawning and rearing periods.

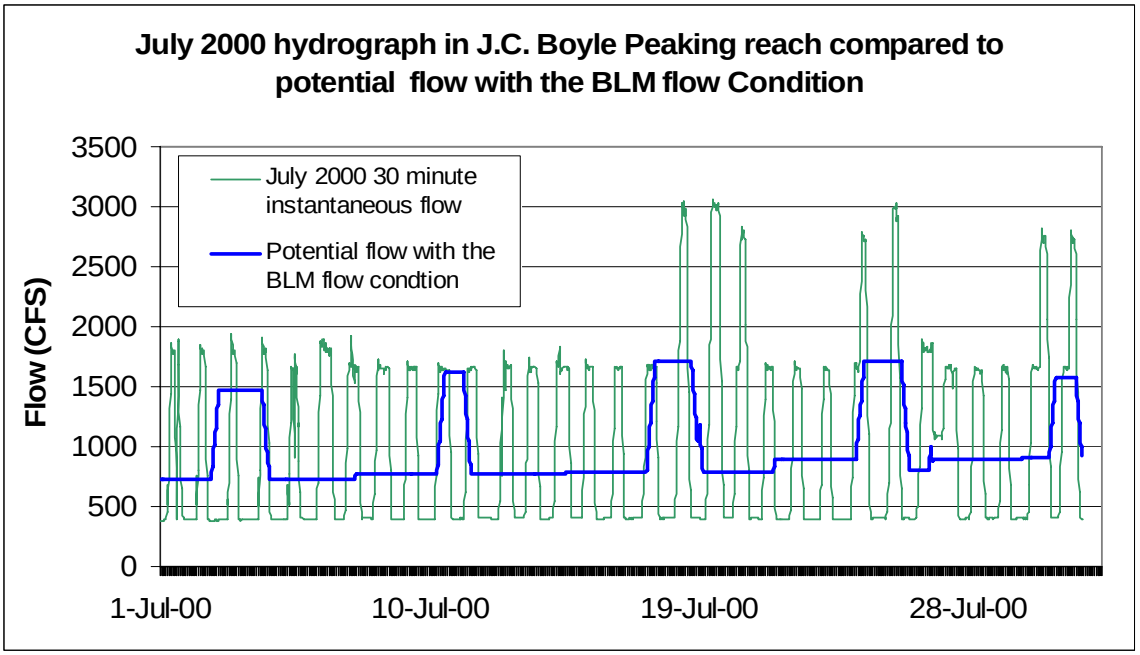
Impacts of the Condition in the Peaking Reach:
The amount of wetted perimeter change occurring between 350 cfs and 700 cfs is approximately 3.8 feet per 100 cfs versus 1.9 feet per 100 cfs between 700 cfs and 1,500 cfs (PacifiCorp 2005 - Peaking Impacts Report). This data indicates that the smallest degree of change to the wetted perimeter occurs at higher flows, and that flows that do not drop below 700 cfs would avoid the most extreme dewatering and associated impacts. The minimum base flow condition requiring a discharge that would result in 690 cfs downstream of the J.C. Boyle Powerhouse would avoid extreme changes in the wetted perimeter in the varial zone. As a result, the Condition would prevent dewatering of many of the low gradient (less than 2% to 4%) bank slopes that are susceptible to conditions that cause fish stranding.

Reducing flow fluctuations at least six months of the year to once per week would alter the varial zone, such that an increase in aquatic and riparian habitat would be expected. Reducing the amount of peaking would decrease the frequency of scour in the varial zone. Less scouring and more stable flows would support the establishment and survival of desirable riparian vegetation. It is anticipated that the decreased frequency of scouring would allow substrate to persist, such that the material needed for establishment of desirable species (e.g., willows) would be present in the varial zone. Further, providing a higher, more stable base flow would allow riparian vegetation to recolonize the varial zone. This larger riparian area would become aquatic habitat available for fish, macroinvertebrates and other aquatic life. In comparison to current frequent

flow fluctuations that favor the undesirable reed canary grass riparian community, the Condition requirement for reduced ramp rates combined with a more constant and higher base flow would aid in re-establishment of desirable riparian communities.

The Condition requires the Licensee to provide the same minimum flows on the weekdays in the J.C. Boyle Peaking Reach that result from the implementation of the J.C. Boyle Bypassed River Reach flow requirements. In addition, the weekly peaking cycle during the summer months (May 1st to October 31st) would decrease the number of peaking events from daily during most summers to four or five times a month (Figure 4-5). This would decrease impacts from summer daily peaking to the fisheries and riparian resources, while providing for power generation and whitewater boating opportunities. Reducing the magnitude of flow fluctuations and increasing base flow can improve fish productivity (McKinney et al 2001).

Figure 4-5: Instantaneous 30 minute flow measured below J.C. Boyle Powerhouse during July, 2000 compared to a potential peaking cycle under the BLM streamflow condition.



The Licensee conducted a PHABSIM analysis for the peaking reach, but the results appear to be unresponsive to changes in flow. The PHABSIM analysis conducted by the Licensee in the Klamath River likely reflects impacts on channel shape, channel complexity, substrate composition, and riparian vegetation from the highly modified flow in J.C. Boyle Peaking Reach. The Weighted Usable Area (WUA) relationships for rainbow trout presented by PacifiCorp in their April 2005 addendum to the instream flow study are remarkably flat for adults and juvenile habitat, changing only slightly over the range of flow available to the Klamath River. Therefore, the current PHABSIM relationships have limited utility in determining flow needs for most life stages of trout and sucker.

Although the results of the adult and juvenile habitat analysis for the peaking reach are difficult to interpret because of their unresponsiveness to changes in flow, the result for fry habitat availability indicate substantial increases in fry habitat with an increase in minimum base flow. The WUA estimates for the peaking reach suggest that trout fry and sucker larvae habitat

availability increase with increasing flows. More habitat is apparently available at higher flows because more edge habitat becomes available (PacifiCorp Instream Flow Addendum Report 2005). In addition, these higher flows come into contact with existing riparian vegetation (PacifiCorp Instream Flow Addendum Report 2005). More fry and sucker larvae habitat would be available under the minimum base flow requirement in the Condition (see Figure 4-4 above). The WUA curves show very low amounts of habitat are available for trout fry and sucker larvae at any flow (low percent of area), and therefore may be a limiting factor for cohort recruitment in this reach. Fry may be the most critical life stage limiting trout populations in the peaking reach due to low habitat availability.

The BLM instream flow analysis (USDI BLM 2002) indicates that substantial increases in fry habitat availability and moderate increases in juvenile and adult habitat availability would be gained with an increase in minimum base flow conditions. Additionally, the proportional flows would result in increased flows in April, May, and June when trout fry and sucker larvae are present, providing even greater habitat gains, particularly for early life stages (Table 4-5).

Table 4-5: Percent of total area and percent of optimal habitat availability interpreted from PacifiCorp instream flow analysis (PacifiCorp 2005).

J C Boyle Peaking Reach			
	Flow (cfs)	**% of Area**	**% of Maximum**
PacifiCorp Existing Condition	~325	3.8%	57.4%
BLM 4(e) Minimum Flow	~690	3.9%	65.8%
Values calculated from PacifiCorp (2005) WUA curves.			

The proportional flows would likely result in increased flows in April, May, and June during the runoff season when trout fry and sucker larvae are present (PacifiCorp 2004b), providing habitat gains, particularly for early life stages. However, PacifiCorp did not provide time series analyses using the available periodicity information for the modeled species and life stages. This is a recommended procedure in Instream Flow Incremental Methodology (IFIM) for determining potential habitat bottlenecks in species life histories when evaluating flow needs for regulated rivers (Bovee et al 1998).

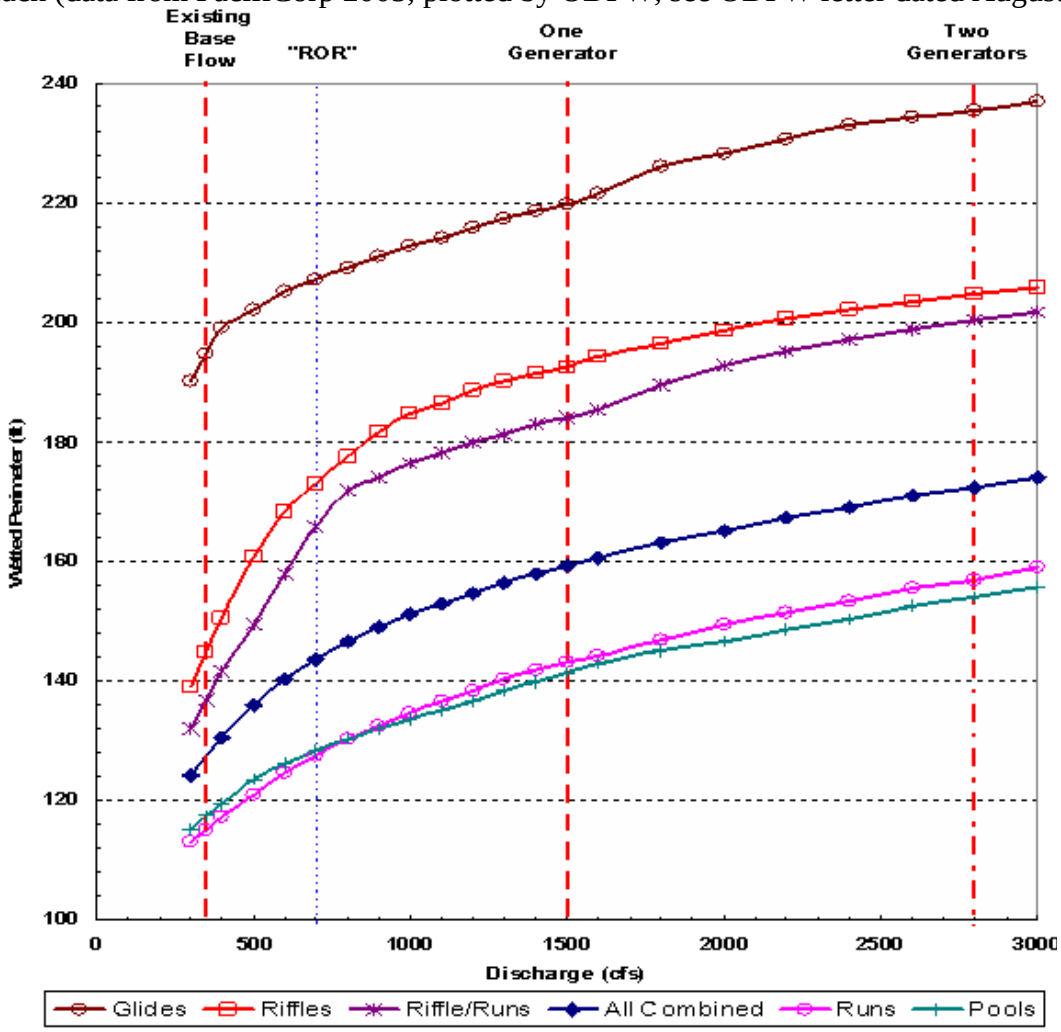
The conclusion that the BLM flow requirement would provide increased habitat availability is also supported by the BLM flow study (USDI BLM 2002, Figure 24, page 62) which derived habitat relationships for the upper peaking reach. The WUA versus stream discharge relationships for both BLM and PacifiCorp studies, when viewed in light of their limitations due to channel impacts and inclusive of other biological and physical data (e.g. macroinvertebrate drift, sediment transport and riparian vegetation) suggest that the increased base flows would benefit aquatic and riparian resources.

PacifiCorp conducted a wetted perimeter analysis in the peaking reach (PacifiCorp 2005), however the analysis was limited to a comparison of the peaking cycle base flow (lowest flow reached during a peaking cycle) against a single, assumed continuous flow under the undefined "Run of River" (ROR) flow regime (Figure 4-6). The full range of peaking impacts occurs over the lowest to highest flows during peaking cycles, including both single- and two-turbine operations, with a range of approximately 350 cfs to 1,500 cfs and 350 cfs to 3,000 cfs respectively. The wetted perimeter analysis in the peaking reach indicated that the percent of

wetted perimeter change for a single turbine peaking operation is 32% for all types of habitat and 47% in riffle habitats. Over the range of two-turbine peaking operations, the change in wetted perimeter is 48% for all types of habitat and 61% in riffle habitats. These changes represent the extent of dewatering in the channel which commonly occurs daily from peaking.

Inflection points on the wetted-perimeter analysis indicate areas of rapid changes, especially in sensitive habitat and/or microhabitats and features. Representation of an overall average curve (as in PacifiCorp 2005) obscures these changes, as they are combined with all the non-sensitive areas. The greatest amount of wetted perimeter change occurs over the range of 350 cfs to 800 cfs, indicating the highest degree of impact in this range. Figure 4-6 suggests that the flow in the peaking reach should generally range above 700 cfs to 800 cfs in order to avoid the most extreme dewatering and associated impacts (the approximate range of the inflection point in average wetted perimeter). Providing the required minimum bypassed reach flow combined with spring accretions results in approximately 700 cfs in the peaking reach during off-peak operation periods. This avoids the high dewatering impacts associated with flows lower than the inflection points (Figures 4-5 and 4-6).

Figure 4-6: Wetted perimeter versus discharge for all habitat types in the J.C. Boyle peaking reach (data from PacifiCorp 2005, plotted by ODFW, see ODFW letter dated August 12, 2005).



The BLM flow condition would result in less frequent peaking events from May through October (weekly versus daily) as illustrated in Figure 4-5 which compares a potential outcome of the flow requirements in the Peaking Reach in July, 2000 to the existing flow conditions. Peaking events would be lower in magnitude relative to base flow and occur less abruptly due to ramping rate restrictions. It is expected that lowering the frequency and magnitude of peaking events would reduce the energetic costs associated with peaking induced fish movements and reduce the likelihood of fish stranding and associated predation and mortality.

Further support for meaningful increases in habitat quality and quantity is provided by PacifiCorp in the analysis of side channel inundation flows (PacifiCorp 2004b, Table 4.7-7). Side channels often have slower velocities and provide high quality microhabitat for rearing and spawning fish (Bowen et al 2003). The Licensee identified nine side channels in the J.C. Boyle Peaking Reach and estimated the streamflow at which inundation of the side channels would occur. Six of these side channels receive flows when streamflows are greater than the current minimum flow (approximately 330 cfs per PacifiCorp 2004b). Of these, four would begin to receive flow at streamflows of approximately 700 cfs. According to this analysis, seven of these side channels could be potentially dewatered following peaking flows that recede to a base flow of 330 cfs. In contrast to the nine side channels identified by PacifiCorp, BLM identified 36 side channels in the J.C. Boyle Peaking Reach using aerial photographs. This indicates that there is even more potential for increased habitat with the Condition than indicated by the PaciCorp analysis.

Impacts of the Condition in the Bypassed and Peaking Reaches:
The Condition provides **habitat connectivity** for resident and migratory fish, and potentially anadromous fish. The flows required in the Condition provide spawning and rearing habitat in the J.C Boyle Bypassed River and Peaking Reaches. Instead of 10% to 25% of the flow in the Klamath River at the J.C. Boyle Powerhouse, the minimum and proportional flow would result in at least 25% to 63% at the J.C. Boyle Powerhouse. Thus, delays in migration would be less likely and depth and cover for migration would be increased.

PacifiCorp evaluated stranding potential downstream of the bypassed reach (PacifiCorp 2004a, Peaking Effects Study). However, the results provide little insight to potential stranding or displacement effects because fish density was very low during the study. Furthermore, no studies were conducted in the bypassed reach where most of the spawning activity in the Klamath mainstem occurs (PacifiCorp 2004b). Since a proportion of inflow would be required as instream flow in the bypassed reach, water levels would need to be managed such that impacts from water level adjustments are not causing excessive fish mortality or impairing spawning success. A ramp rate of two inches per hour would provide for protection for aquatic organisms to adjust to changing water levels without excessive mortality due to poor spawning success, entrapment, or stranding (Hunter 1992).

4. Recreation

Impacts of the Condition in Bypassed Reach:

According to PacifiCorp analysis, (PacifiCorp 2004k, page 2-61, 62, 2-90, 91), for the bypassed reach, kayakers identified a flow of around 500 cfs as a minimum to use the river for transportation, and rafters 1,000 cfs as a starting point for acceptable quality. Kayakers

"recognized that quality "technical trips" are not provided until flows are above 800 cfs. An optimal range for "technical kayaking trips" is from about 900 to 1,200 cfs." For rafters an optimal range for technical boating was 1,000 to 1,300 cfs. Standard opportunities for both craft appear acceptable at about 1,300 cfs, and they are optimal from that flow to about 1,600 or 1,700 cfs."

The proportional flow requirement in the Condition would provide opportunities for recreational boating. Depending on the water year, acceptable to optimal flows for kayaking and rafting would be provided in the range of 800-1200 cfs during the spring runoff for some years. Flows in this range are provided in May for year 2000 and through June in the year 1998. The benefits to providing flows for boating on the J.C. Boyle Bypassed River Reach include expanding opportunities for multi-day trips on the Hell's Corner Reach and providing challenging, short distance trips down to the Spring Island launch site for single day use.

Impacts of the Condition in the Peaking Reach:

According to PacifiCorp analysis (PacifiCorp 2004k, page 2-61, 2-62, 2-90, and 2-91) for the peaking reach, kayakers identified a flow of around 500 cfs as a minimum to use the river for transportation, and quality "technical trips" are not provided until flows are above 700 cfs. An optimal range for "technical kayaking trips" is from about 800 to 1,200 cfs. For the peaking reach, boaters required a minimum of 700 cfs to use the river for transportation. "An optimal range for technical rafting is about 900 to 1,300 cfs." "Boaters recognize the difference between technical and standard trips. The transition between these trips is about 1,200 to 1,300 cfs for kayaks, and about 1,400 to 1,600 cfs for rafts." "Standard opportunities for rafting become optimal at about 1,450 cfs. Standard opportunities for kayaking are acceptable at 1,300 cfs, but they require 1,450 cfs to be optimal." The development of the minimum streamflow requirement also compared the number of boating days resulting from implementation of the FLA proposed requirements, the interagency recommended flows, and the BLM Condition.

The impacts of the Condition were evaluated using the BLM Flow Management Scenerio (FMS) model, and compared the number of days of actual rafting use to the number of days available for rafting with the BLM Condition, and the interagency group fish flow recommendation. A limitation of this comparison is that the actual use does not reflect the number of days available as shown in the FMS Modeled Flows. It is expected that implementation of a weekly peaking cycle would result in a shift of use, from weekdays to the weekends. It is also expected that some boating opportunities would be lost due to the unavailability of adequate rafting flows during weekdays. The FMS Model results shows that the interagency group fish flow recommendation provides less total and weekend rafting days than the BLM Condition (Table 4-6).

Table 4-6: Projected Rafting Use Resulting from the BLM Condition

Year	Rafting Use Reports		FMS Modeled Flows			
	Actual Use		BLM Condition		Fish Flow	
	Total Days of Use	Weekend Days of Use	Total Days Available	Weekend Days Available	Total Days Available	Weekend Days Available
1994 (dry)	110	53	12	12	0	0
2000 (avg)	114	54	108	69	93	59
1998 (wet)	103	47	127	72	115	64

5. Power

In accordance with the BLM's multiple use objectives, the Condition provides for power operation. Since a 40% proportional flow is required, up to 60% of the inflow to J.C. Boyle Reservoir is available for diversion to the J.C. Boyle Canal and the turbines, as long as the base flow requirements are met. A base monthly model has been developed using CALSIM, a general purpose river and reservoir systems planning model developed by the State of California Department of Water Resources (personal communication, Nancy Parker, US Bureau of Reclamation, March 2006). The BLM Condition was modeled to determine power generation using the period of record (1959 to 2000). These results show the modeled power production available during five water year types (Table 4-7). A discussion of various approaches to valuing replacement power can be found in the technical memo: Replacement Power Values, DOI Office of Policy Analysis, March 27, 2006.

Table 4-7: Modeled J.C. Boyle Power Production Using BLM Condition—470 cfs minimum flow or 40% of inflow whichever is greater and a 2 inch per hour ramp rate below JC. Boyle Powerhouse.

Klamath River Power Production in MWH – J.C. Boyle					
	Dry	**BA**	**Avg**	**AA**	**Wet**
Oct	12,680	15,391	16,145	12,835	11,644
Nov	16,105	18,864	19,065	16,324	19,587
Dec	16,469	19,803	25,772	25,522	27,807
Jan	13,284	19,588	28,731	28,143	27,397
Feb	5,798	18,205	21,617	26,513	28,219
Mar	4,413	21,325	27,200	39,954	50,641
Apr	1,555	11,054	23,464	39,841	55,458
May	1,144	4,749	14,040	27,854	34,049
June	36	725	4,206	5,865	23,039
July	0	188	1,070	1,959	3,607
Aug	0	2,692	3,290	3,235	5,116
Sept	1,444	5,420	10,723	11,430	12,847
Total	72,928	138,004	195,324	239,474	299,410

The Condition integrates flows needed for maintenance and improvement of aquatic and riparian resources, while also allowing for power production.

Rationale - (C) Streamflow Measurement and Reporting: J.C. Boyle Bypassed River and Peaking Reaches

1. Current Project Measurement and Reporting

The Project currently maintains two stream gages in cooperation with USGS on the Klamath River in Oregon. These gage stations include the Klamath River near Keno (below Keno Dam, #11509500) and Klamath River below the J.C. Boyle Powerhouse (#11510700). The Spencer Creek near Keno stream gage (above the confluence with the J.C. Boyle Reservoir, #11510000) was operated intermittently through September, 2003 by Oregon Department of Water Resources. Instream flow data from the USGS gage sites is made available to the public through the USGS National Water Information System (NWIS) for surface water, and a report of the flow record is provided to the Commission annually. In addition to an annual report, PacifiCorp notifies the Commission when Project operations are out of compliance with the existing license requirements.

2. Current Project Measurement and Reporting Impacts

There is a lack of discharge data for the J.C. Boyle Bypassed River Reach since the Project currently maintains stream gages upstream of the J.C. Boyle Dam and below the J.C. Boyle Powerhouse. As a consequence, information that could be used to determine Project impacts to aquatic and riparian resources is not available. Further, since there is no stream gage in the bypassed reach, the analysis of effects from spring accretions is limited.

Responding to impacts to riparian and aquatic habitat from non-compliance due to Project operations is delayed as a result of the current measurement and reporting system. For example, the Project has had regular non-compliance issues, including ramp rates in the J.C. Boyle Peaking Reach (Huntington 2004). According to Huntington, the nine inch per hour ramp rate required by the license was exceeded in 1994, 1995, and 1999. Ramp rates up to 14.4 inches per hour were documented all of these years. Although a record of non-compliance events is submitted to the Commission, the BLM is not notified. Thus, evaluation of potential effects to resources by the BLM is delayed or absent.

3. Development of the Streamflow Measurement and Reporting Requirement

Data that is accurate and current is needed to monitor streamflow and ramping rate requirements for implementation of the Condition. The Condition is requiring instream flow monitoring from four stream gages and an annual report. Flow data from the required sites is needed to determine locations where Project operations are out of compliance and could impact riparian and aquatic habitats in the bypassed and peaking reaches. The additional streamflow data required from sites where discharge is not currently measured would be used to improve analysis of potential resource effects in the bypassed reach.

The Licensee shall provide real-time flow information and projections for both the J.C. Boyle Bypassed River and Hells Corner Reaches to allow boaters to take advantage of regularly scheduled boating releases and natural spill events. Commercial rafting outfitters and private

boaters would benefit from flow forecasts. In addition, providing up-to-date flow information in an easy and accessible way would also benefit anglers.

4. Effects of the Streamflow Measurement and Reporting Requirement

The annual reporting process provides a means of identifying potential natural resource impacts due to Project operations and provides a process to implement adaptive management during the term of the new license. Continuous discharge data from the required sites allows for timely determinations of where and when natural resource impacts may be occurring. Providing flow information allows the public to take advantage of flows that would be suitable for kayaking, rafting, and fishing and other recreational activities. Implementation of annual monitoring and reporting would provide a means for the BLM to inform the Licensee and the Commission when impacts to resources arise during the term of the new license. By reporting this data, there is a record of information that may be used to develop strategies to prevent similar Project impacts in the future. The discharge data and annual report would be used to ensure the flow regime, including ramping rates, required in the Condition has been implemented.

Rationale - (D) River Gravel Management Plan (RGMP)

Gravel augmentation would restore spawning gravel to portions of the Klamath River channel that have been deprived of sediment inputs due to the Project. Larger gravels and cobbles that are unsuitable for use by spawning fish dominate (Kondolf and Matthews 1993; PacifiCorp 2004d). PacifiCorp states that "pebble count results indicate potential bed coarsening immediately downstream of Project dams and in the J.C. Boyle peaking and bypass reaches" (PacifiCorp 2004d). As a result, the channel has limited gravel-sized material necessary for the spawning life history stage of salmonids and other native fishes. Maintaining an annual supply of gravel and cobble sized material aids in accomplishing ACS objectives. Mitigation of Project effects to channel complexity (side channels, point bars, riffles, and floodplains) would lead to attainment of BLM management objectives for restoring and maintaining geomorphic processes and aquatic and riparian habitats in the J.C. Boyle Bypassed River and Peaking Reaches. The addition of adequate quantities and sizes of gravel and cobble material is needed to provide spawning substrate for both resident and anadromous fish and other aquatic life.

1. Impacts

Current Project impoundments, including J.C. Boyle Reservoir and Dam, trap and block sediment movement downstream through the J.C. Boyle Bypassed River and Peaking Reaches (PacifiCorp 2004a, Exhibit E, page 5-148 and PacifiCorp 2004d, page 6-111). According to the FLA, the primary project impact on geomorphology and sediment transport is the capture of bed load material delivered from tributaries by Project reservoirs (PacifiCorp 2004a, Exhibit E, page 3-184). This, coupled with limited gravel recruitment from the presence of J.C. Boyle Dam (City of Klamath Falls 1986) (PacifiCorp 2004a, Exhibit E, page 4-9), causes gravel to be scarce in the J.C. Boyle Bypassed River Reach. Based on the PacifiCorp Sediment Budget Analysis, the average annual input of sediment from the tributaries between Keno Dam and J.C. Boyle Dam was 6,134 tons per year (PacifiCorp 2005 - Master Sediment Budget). Thus, between the

J.C. Boyle Reservoir and Dam, approximately 6,134 tons per year of suspended sediment and bedload are blocked from moving down the J.C. Boyle Bypassed River and Peaking Reaches.

Oregon Department of Fish and Wildlife surveys conducted in 1998 found substrate composition was 64% boulder and 28% cobbles in the J.C. Boyle Bypassed River Reach (ODFW 1998). Gravels are generally lacking except for an area below the canal spillway where deposition has occurred from hillslope erosion (PacifiCorp 2004d, page 6-86). The characteristics of substrate in the bypassed reach are consistent with impacts associated with stream habitat below a bedload-capturing dam; presence of bedrock, cobble and boulder, and few patches of spawning gravels.

Most trout were observed spawning in marginally suited "patch gravels" behind boulders and in the area below the emergency spillway that contains gravel because of recruitment from hillside erosion below the emergency spillway. Thus, according to PacifiCorp analysis, the limitation of gravel in this reach is limiting trout spawning (PacifiCorp 2004a, Associated Fisheries Benefits). Since substrate in the J.C. Boyle Peaking Reach is heavily armored with boulders and large cobbles and contains only a few small pockets of tightly embedded gravel behind boulders, (PacifiCorp 2004a, Exhibit E, page 4-11), there is no or little spawning habitat for trout (City of Klamath Falls 1986; USDI BLM 2002). Gravel accumulation in this reach is limited, because J.C. Boyle Dam blocks gravel recruitment and there are few tributary streams to contribute gravel. PacifiCorp identified that the lack of redband trout spawning habitat as a potential limiting factor for fish in this reach (PacifiCorp 2004a, Exhibit E, page 4-13).

Changes in the flow and sediment regimes due to Project operations and facilities impact the potential establishment of desirable riparian vegetation. J.C. Boyle Dam reduces the input of gravel, sand, and silt to this reach (PacifiCorp 2004b, Exhibit E 5-148). In addition, flow diversions and changes in the flow regime reduce the potential for scouring and sediment deposition of the limited material that is transported downstream of the dam (PacifiCorp 2004c, pp. 6-135). Further, since the streamflows, sediment supply, and bed mobility are reduced, the extent of substrate appropriate for establishment of willows and other native riparian plants is decreased.

According to PacifiCorp analysis, the Project contributes to the lack of willows in streamside areas (PacifiCorp 2004b, Exhibit E 5-102). Riparian hardwoods typically germinate and establish on freshly deposited alluvium in channel positions low enough to provide adequate moisture but high enough to escape scour (Scott et al. 1993). The Project, however, maintains static hydrologic and geomorphic conditions that do not provide alluvium over a large portion of the area where willows have the best potential to establish.

In the upper portion of the J.C. Boyle Bypassed River Reach the river is constrained by sidecast material present in the margins of the active stream channel. This material was generated during the construction of the J.C. Boyle Canal and road and continues to impact 1.5 miles of the channel. The sidecast material has constricted the channel and altered the riparian vegetation along most of the reach (PacifiCorp 2004b Exhibit E, 5-25, 2004). Alteration of instream flows and changes in sediment regimes result in decreased bank stability and loss of riparian vegetation (Hill 1991; Rosgen 1996). Desirable riparian vegetation (e.g., willow) does not establish and survive in the conditions created by the boulder-sized rocks comprising the sidecast. Further, in

some areas this material has entered the active channel and is causing accelerated bank erosion on the opposite bank (PacifiCorp 2004d).

2. Development of the condition

The amount of gravel supplied to the bypassed and peaking reaches was derived from the average annual input from tributaries between Keno Dam and J.C. Boyle Dam. The average annual input to the reach above the J.C. Boyle Dam was determined to be 6,134 tons per year (PacifiCorp 2004d, AIR WQ-5, Master Sediment Budget 051105k.xls). Thus, the Condition requires the gravel augmentation to range from 1,227 tons per year (20% of 6,134 tons per year) to 6,134 tons per year or 100% of the average annual input (See Table 4-8).

Table 4-8: Gravel Augmentation

	Average Annual Input from Tributaries above J.C. Boyle Dam	PacifiCorp Proposal for First year*	BLM Proposal Annually for 5 years*
J.C. Boyle Bypassed River Reach	6,134 tons per year	100 to 200 cubic yards (2% - 3% of amount blocked.) Also states "10% to 20% of tributary amount.	1,227 tons per year (20% of amount blocked) into bypassed and peaking reach.
* Augmentation in future years based on evaluation.			

According to the Final License Application (FLA), gravel augmentation is proposed as an enhancement measure by PacifiCorp, in part because of the effects on geomorphology and sediment transport from the capture of bed load by Project reservoirs (PacifiCorp 2004a, Exhibit E, page 3-184). PacifiCorp proposed the following gravel augmentation enhancement measures:

> "The volume of the initial augmentation in selected reaches is calculated as 10 to 20% of the average annual volume of tributary and hillslope inputs trapped in the upstream Project reservoir(s). The range of 10 to 20% adjusts the results of the sediment budget to reflect the fact that only a fraction (probably less than 10 percent) of the total tributary sediment yield in each reach is composed of spawnable material. Given the long-term reduction in gravel supply below Project dams, gravel augmentation could begin with a larger volume to fill in-channel storage sites." (PacifiCorp 2004a, Exhibit E, page 4-169)

PacifiCorp found the median size of material that was sampled in the reservoirs deltas where tributary inputs are deposited to be 34.16 mm (PacifiCorp 2004d, page 6-128). Kondolf and Wolman (1993) compiled an extensive data set of salmonid spawning gravels which showed that the median gravel size used for spawning was 25 mm and the geometric mean gravel size was 16mm. Their analysis also found that salmonids can use a wide range of gravel sizes.

Timing and location of gravel augmentation is required as part of the RGMP because of the potential adverse impacts to resident and anadromous fish. Timing of gravel placement must be considered, as protection of habitat during spawning periods is necessary. Further, the location of gravel placement is essential to the success of providing additional fish habitat since the augmentation of gravel should occur where smaller substrate is lacking and where fish could use this material for different life stages.

3. Condition Impacts
The RGMP would provide a strategy (implementation, monitoring, and adaptation) for satisfying KFRA RMP management direction, including maintenance and improvement of aquatic and riparian resources.

Sediment augmentation is needed on a recurring basis at multiple sites established throughout the bypassed and peaking reaches to mitigate for Project impacts that occur downstream from J.C. Boyle Dam and to meet management direction for aquatic and riparian habitat. Initial large volumes of gravel delivered to multiple sites would replenish in-channel storage sites that have been deprived of sediment. In addition, by providing sediment in subsequent augmentation events, substrate would be distributed by alluvial processes.

Adding river material with a median gravel size appropriate for spawning salmonids would create a dynamic and complex river channel. This substrate size is deposited, re-mobilized, and transported more frequently than larger sized material. The augmentation of appropriately sized gravel would create substrate with clean interstitial spaces; provide gradually sloped channel margins (optimal for channel margin rearing habitat); would minimize encroaching vegetation on point bars; and would create a fine substrate replacement on floodplain terraces.

Addition of ample quantity, and appropriately sized gravel and cobble material are needed to increase channel complexity and availability of spawning habitat for resident, migratory, and anadromous fish. Implementation of the RGMP would provide for the geomorphic and ecological processes needed to adequately protect aquatic and riparian resources, and provide for the attainment of KFRA RMP and ACS objectives, in the J.C. Boyle Bypassed and Peaking Reaches.

Rationale - (E) Adaptive Management Plan

The Adaptive Management Plan (AMP) includes provisions and processes for applying adaptive management principles. Adaptive management strategies would provide the necessary link between the Conditions and the KFRA RMP management direction. The AMP includes an adaptive management strategy that incorporates implementation, monitoring, and evaluation of results to allow the Licensee to determine effectiveness of the Condition. Effective monitoring plans developed in coordination with the resource agencies would provide the best opportunity for achieving aquatic resource objectives in the Project area over the term of the License (Castleberry 1996).

The components of the River Corridor Management Condition are expected to produce changes in channel morphology that would mitigate for the continuing impacts under the new License. As additional minimum, seasonal high, and variable flows are returned to the J.C. Boyle Bypassed River and Peaking Reaches, there would be alterations in the amount and quality of available fish habitat due to changing channel configurations. Consequently, continuous monitoring is required to assess changes in channel morphology and to provide for the appropriate instream flows to protect the BLM reservation. This information would be used as the basis for providing scientifically based alterations in instream flows to mitigate the impacts of Project operations.

Habitat condition, habitat production, spawning habitat, and habitat connectivity monitoring data would provide the basis for determining whether the Condition is providing for the needs of fish habitat. Fish-habitat relationships generated for the bypassed and peaking reaches reveal that Project operations have impacted substrate suitability and near shore vegetation cover. After implementation of the Condition, it is predicted that habitat would change. The habitat monitoring is necessary to evaluate if those changes meet the KFRA RMP objectives. Fish passage provisions required under Section 18 prescriptions may result in additional species interactions, changes in fish community structure. Fish habitat monitoring is needed to determine effects of Project operations and implementation of the Conditions on the resident, migratory, and anadromous fish species.

Condition No. 5 – Cultural Resources Inventory and Management

A. Conduct Cultural Resources Inventory

Within one year of issuance of the License, the Licensee shall complete cultural resources inventory of Bureau of Land Management (BLM) land within the Area of Potential Effect (APE).

1. In consultation with the BLM and affected tribes, the Licensee shall conduct a cultural resources inventory of approximately 77.2 acres of BLM-administered land within the APE that have not been inventoried (Figures 5-1 through 5-5).
2. The Licensee shall employ survey standards consistent with BLM Class III survey protocols for cultural resources (USDI BLM 1998).
3. In consultation with the BLM and affected tribes, the Licensee shall document newly identified sites according to BLM and State Historic Preservation Office (SHPO) standards and assess the sites for eligibility on the National Register of Historic Places (NRHP). Newly discovered sites shall be incorporated in an amended HPMP that includes measures for the continued protection and management of cultural resources.
4. The Licensee shall submit a draft report to the BLM documenting the results of the survey within 60 days of survey completion. The report shall follow SHPO report guidelines. The Licensee shall allow a minimum of 30 days for the BLM to review and make recommendations on the draft before finalizing the report and filing it with the Commission. A copy of the final report shall be submitted to the BLM, affected tribes, and the SHPO.
5. In consultation with the BLM and affected tribes, the Licensee shall develop a protocol for conducting cultural resources surveys on BLM land prior to future Project activities proposed within the APE. If a project is proposed within an area where cultural resource surveys are older than 15 years, the Licensee shall conduct a new survey.
6. In consultation with the BLM and affected tribes, the Licensee shall develop procedures for handling, cataloging, interring, or repatriating cultural resources on BLM land exposed by unanticipated Project related effects.

B. Amend Historic Properties Management Plan

Within 18 months of issuance of the License, the Licensee shall amend the Historic Properties Management Plan (HPMP) to address the management of sites on BLM-administered lands within the APE.

1. The Licensee shall amend the HPMP with measures to monitor, stabilize, protect, restore, and/or mitigate for known damages to sites within the APE on BLM land including sites: 35KL18, 35KL21/786, 35KL22, 35KL24, 35KL550, 35KL558, 35KL567, 35KL576, 35KL577, 35KL629, 35KL630, 35KL632, 35KL633, 35KL635, 35KL785, 35KL791, 35KL1083, and JC03-29. Sites discovered during the completion of surveys on BLM land within the APE shall also be included in the amended HPMP.
2. The Licensee shall submit a draft of the amended HPMP to the BLM for review. The Licensee shall allow a minimum of 30 days for the BLM to review and make recommendations on the draft before finalizing the report and filing it with the Commission. A copy of the final amended HPMP shall be submitted to the BLM, affected tribes, and the SHPO.
3. Monitoring (per the amended HPMP) of BLM cultural sites within the APE shall be completed by a qualified professional archaeologist (as defined in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation).

Monitoring shall involve, at a minimum, visiting 20% of the eligible sites each year to assess impacts, the effect of mitigations in preventing degradation of the resource, whether eligible properties are being affected by Project operations, and whether non-eligible historic properties should be re-evaluated for consideration of eligibility. Monitoring shall be initiated within 180 days of Commission approval.

4. The Licensee shall prepare an annual report documenting mitigations, new findings and assessment of the effectiveness of mitigations in preventing degradation of cultural properties on BLM land. This report shall be submitted to the Commission, the BLM, and affected tribes for use by the BLM into its' Annual Program Summary and Monitoring Report.
5. In consultation with the BLM and affected tribes, the Licensee shall develop a schedule for implementing the amended HPMP. The schedule for implementation for BLM sites within the APE shall address first, those sites which are at greatest risk of continued Project degradation.
6. In consultation with the BLM and affected tribes, the Licensee shall review and/or revise the HPMP every five years to incorporate new information regarding the condition or effects to historic properties on BLM lands (based on the results of effectiveness monitoring); or changes in site eligibility as a function of policy, law, regulation, or advances in scientific technology.

Rationale

Cultural resources on the BLM reservation are managed pursuant to the *Antiquities Act of 1906*, the *Archaeological Resources Protection Act* (ARPA) *of 1979*, the *Historic Sites Act of 1935*, the *Historic and Archaeological Data Preservation Act of 1974*, the *National Historic Preservation Act* (NHPA) of 1966 (as amended), the *National Environmental Policy Act* (NEPA) *of 1969*, the *American Indian Religious Freedom Act* (AIRFA) *of 1992*, the *Native American Graves Protection Act* (NAGPRA) *of 1990*, the *Federal Land Policy and Management Act* (FLPMA) *of 1976*, Executive Order 11593 issued in 1972, and 36 CFR part 800. In addition, the Klamath Falls Resource Area Management Plan (USDI BLM, 1995a) directs the BLM to identify, manage and protect cultural resources as well as to consult and coordinate with affected Native American tribes. Specifically the RMP directs BLM:

- To identify cultural resource localities and manage them for public, scientific, and cultural heritage purposes.
- To conserve and protect designated cultural resources for future generations.
- To continue to fulfill government-to-government and trust responsibilities to appropriate American Indian tribes regarding heritage and religious concerns.

The Project affects cultural resources as a function of flow management, roads, facilities operation, and recreation use. Eighteen NRHP-eligible cultural sites on BLM-administered land exist within the currently defined APE. The Licensee has acknowledged impacts to cultural sites within the Project boundary resultant of public access and recreation (e.g., "Some of these sites appear to be affected by Project operations and/or Project-related activities such as public access and recreation" PacifiCorp 2004e, page 3-1). Additional impacts identified by the Licensee include looting, vandalism, erosion, road and utilities development, livestock grazing, and camping (PacifiCorp 2004e, Tables 3.6-1 and 3.6-2).

Recreation in the Project area is expected to increase over the period of the next license (PacifiCorp 2004k, page 3-54). The Licensee notes that visitors to the Project area mainly are concerned with resting/relaxing, fishing, camping and boating opportunities (PacifiCorp 2004k, pages 3-59 through 3-60). Within the APE on BLM land, these opportunities tend to occur on the river terraces and immediately adjacent to the river. These terraces contain the remains of numerous historical and prehistoric sites which are at risk of continued disturbance. Increased recreation use results in increased disturbance associated with casual collection of artifacts and inadvertent disturbance. This will continue over the period of the new license and over time will contribute to the loss of cultural resources or at a minimum, reduce site integrity.

Of particular concern is the use of all-terrain vehicles (ATVs), including motorcycles, within the canyon. Disturbance to archaeological sites on BLM lands by ATV use has been documented (Canaday 2003) and is expected to continue. At several sites within the canyon, especially at Frain Ranch, ATVs are using prehistoric house pit depressions as jumps/ramps and obstacle courses (PacifiCorp 2004e). This severely disturbs the artifacts as well as the integrity of the structures. Disturbance of archaeological sites from ATV use is expected to continue as long as access to these areas is unrestricted.

BLM consults and coordinates with the Klamath Tribes (a federally recognized tribe consisting of the Klamath, Modoc and Yahooskin band of Paiute) on a bi-monthly basis complying with the above referenced federal laws and regulations. All federal actions that have a potential to affect cultural resources within traditional Klamath tribal territory are identified at these meetings. The intent of the condition is to assemble the appropriate information necessary consult and coordinate with affected tribes in the way BLM is required by law. The Shasta Nation and Shasta Tribe (non-federally recognized) are also kept apprised of major federal undertakings within their traditional tribal territory.

The BLM cultural resource condition is intended to provide for the continued protection of cultural properties on BLM-administered lands.

Complete Cultural Resources Inventory

BLM lands within the APE have not been fully inspected for cultural resources. Therefore, the full extent of Project effects on the BLM reservation is unclear. All BLM lands within the APE require cultural resources surveys to fulfill the intent of the NHPA as well as to meet Tribal trust responsibilities. The BLM routinely conducts cultural resource surveys for its' own ground disturbing activities and requires outside entities wishing to conduct undertakings on federal land to comply with cultural resource laws and regulations.

The Licensee did not identify a cultural resources APE prior to the initiation of cultural resources surveys. Instead, the Licensee proposed a Field Inventory Corridor (FIC) that would encompass the APE when one was designated. Cultural resource surveys were conducted within portions of the FIC during the 2002/2003 field seasons. A proposed APE was submitted to the California and Oregon SHPO and the Yurok Tribal Heritage Preservation Officer on February 2, 2004. A copy of the proposed APE was also provided to the Cultural Resources Work Group (CRWG) at this time. The surveys conducted within the FIC do not adequately cover the entire APE. The Licensee stated in a letter to the Oregon SHPO dated August 2, 2004 (PacifiCorp 2004g), that all land within the APE was adequately inspected for cultural resources. The Licensee maintains that areas within the APE located on BLM land should be surveyed by the BLM. The BLM has

noted (USDI 2004; Raby 2004a; and Raby 2004b) that under Section 106 of the NHPA, the Licensee is obligated to ensure that surveys within the APE are conducted. Further, the BLM notes that portions of the APE on BLM lands have been inspected by BLM to meet management objectives unrelated to the Project re-licensing activity. However, when one compares past surveys with those conducted by the Licensee within the currently defined APE, it is clear that several hundred acres have yet to be inspected. Included in this total are approximately 77.2 acres of BLM land that have not been surveyed. Additional BLM land within the APE has also not been inspected, but it is too steep or marshy for effective survey. The 77.2 acres identified here are areas of relatively gentle topography (BLM Figures 5-1 through 5-5).

Changes in vegetation cover, surface visibility, erosional forces, and survey techniques can affect the reliability of past surveys. BLM routinely re-surveys areas prior to undertakings if the original survey is older than approximately 15 years and often sooner if a proposed undertaking is planned within areas considered to be high probability for containing cultural resources (river terraces, adjacent to water, etc.). The condition requires the Licensee to re-inspect past surveyed areas on BLM land if new ground disturbing projects are proposed for areas that have past survey clearance older than about 15 years.

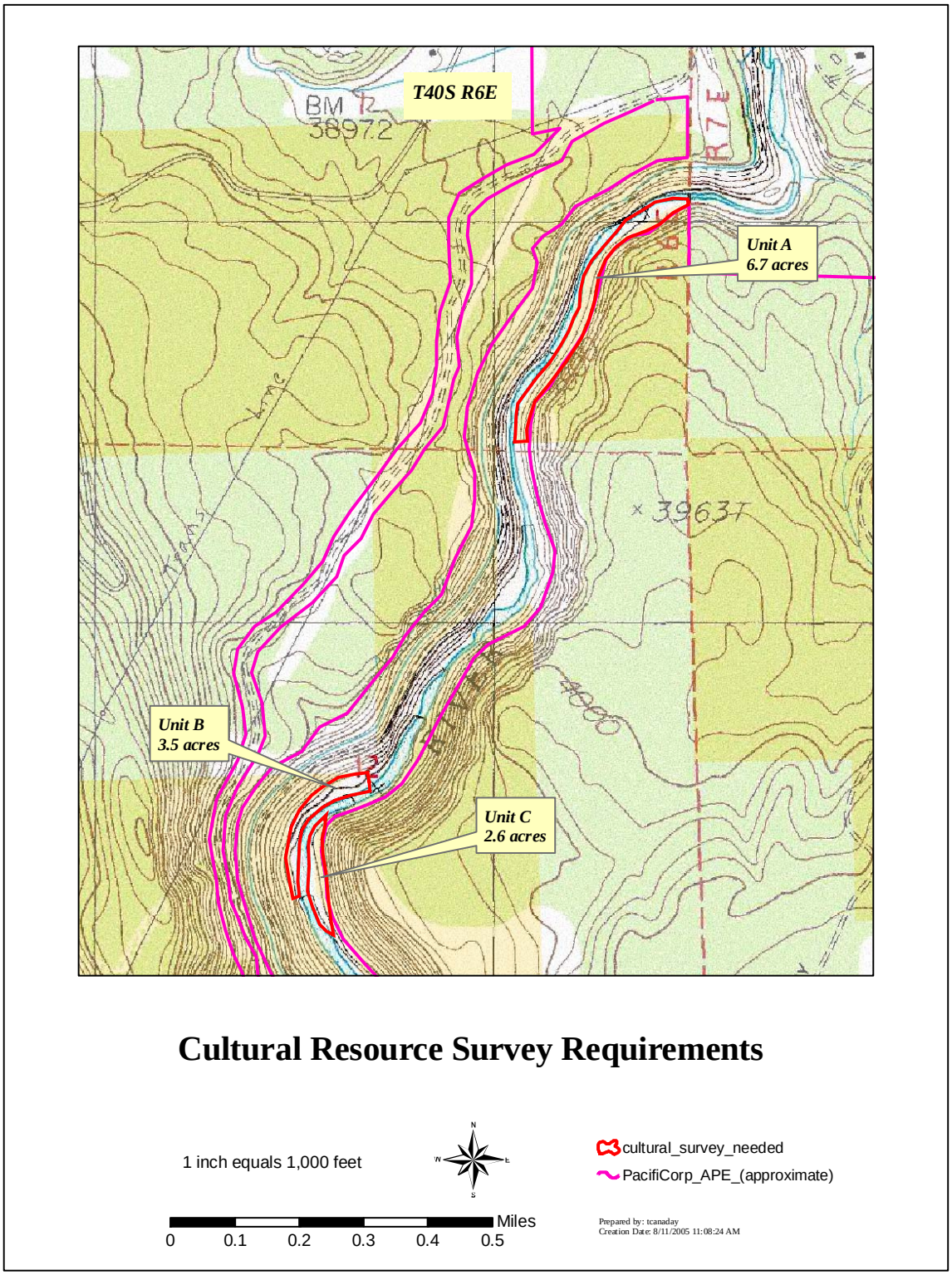
Amend Historic Properties Management Plan

Cultural resources on BLM lands have and will continue to be affected by the Project. The Licensee did not adequately address the survey, protection, monitoring, and mitigation of cultural resources located on BLM lands. The HPMP does not include NRHP eligible sites located on BLM-administered land within the J.C. Boyle Peaking Reach. These sites are within the APE included in the FLA, are impacted by Project operations, and must be included in the HPMP. The Licensee notes, "The FERC has regulations that require that a Historic Properties Management Plan be prepared to mitigate and manage Project effects on cultural resources that are eligible for the National Register of Historic Places (NRHP)." (PacifiCorp 2004j, page 1-1). In the Final Technical Report, the Licensee evaluates NRHP eligibility for 20 sites on BLM land within the APE (PacifiCorp 2004e, Table 3.6-1 and 3.6-2). Two sites (35KL634 and 35KL1419) are not eligible for inclusion in the NRHP. One site (35KL785) was not evaluated because it was not within the FIC inspected by the Licensee. The Licensee's proposed APE now encompasses this site that the BLM considers eligible for the NRHP. The 17 remaining sites were evaluated by the Licensee as being eligible for inclusion in the NRHP. At the time, the Licensee noted the effect of Project operations on these sites (PacifiCorp 2004e, Table 3.6-1 and Table 3.6-2). However, none of the sites are included in the HPMP. This condition requires the Licensee to include these sites in the HPMP.

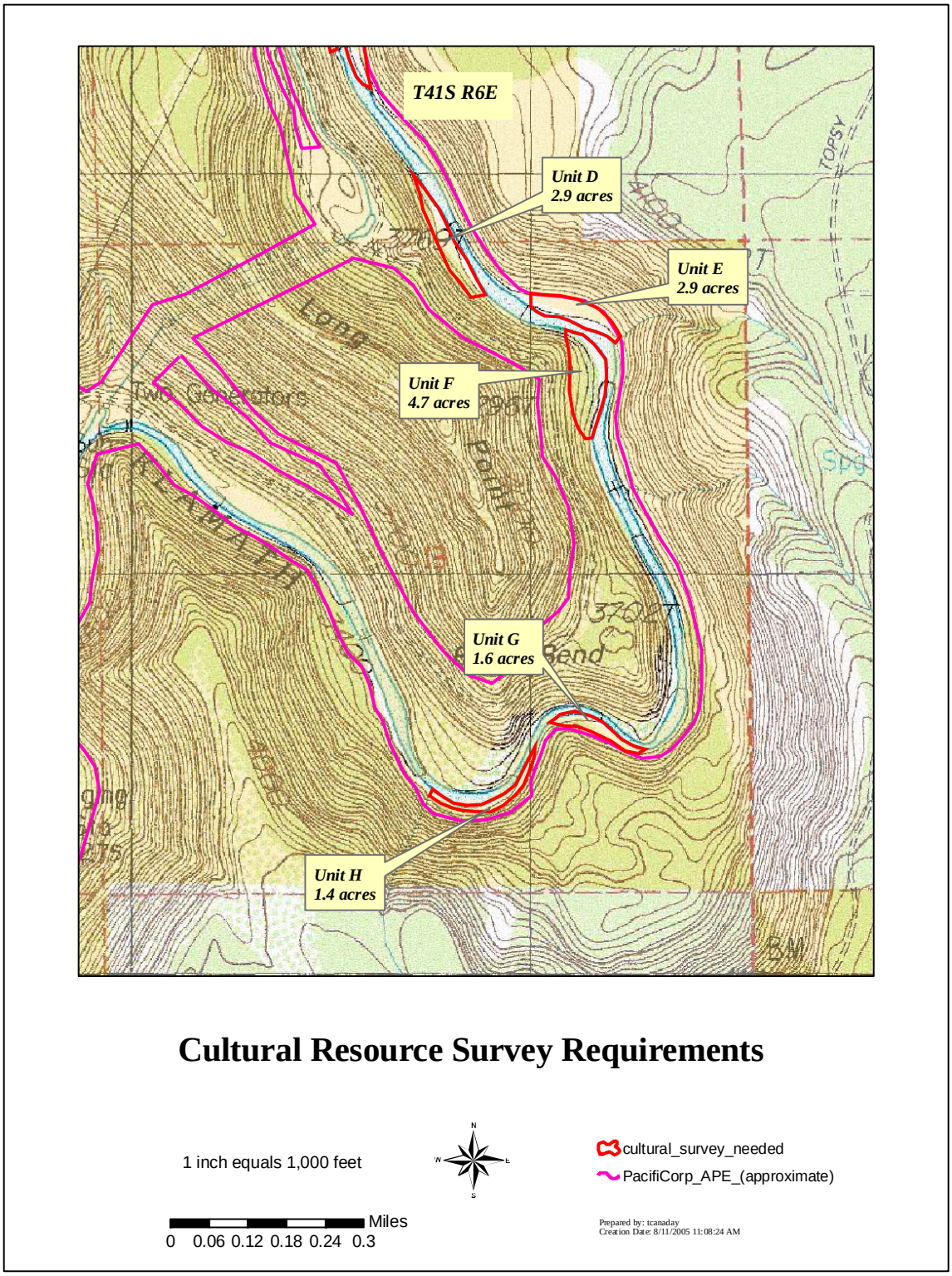
The 18 sites on BLM-administered land within the APE immediately adjacent to the Klamath River in the J.C. Boyle Peaking Reach are impacted by flow fluctuations eroding the river bank. At least one prehistoric site (35KL22) containing human remains has been impacted (PacifiCorp 2004e, Table 3.6-1). Emergency stabilization efforts currently protect a portion of this site. Additional cultural deposits, both upstream and downstream of the stabilized area remain at risk from erosion through periodic wetting and drying of fragile archaeological deposits. Continued ramping, changes in discharge during summer months, and the short duration of peaking will continue to affect the stability of sites adjacent to the river.

The BLM monitors at least 20% of its' cultural resources as directed in the RMP (USDI BLM 1995a). The intent of the condition is to incorporate monitoring of cultural resources on BLM-administered land within the APE consistent with BLM's current management direction.

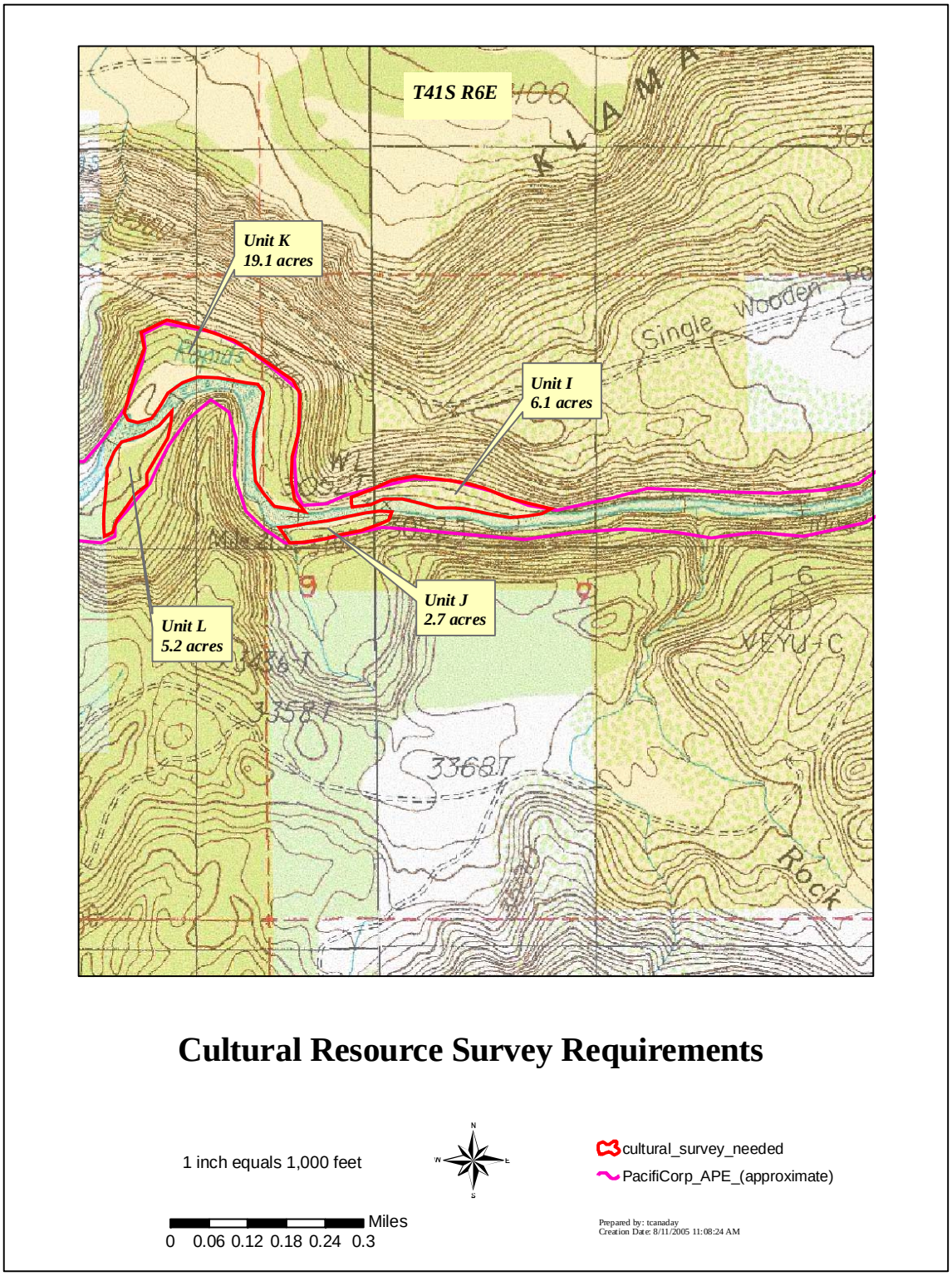
BLM Figure 5-1: Cultural resource survey requirements within the PacifiCorp defined APE. These areas within BLM land were not inspected by PacifiCorp during their surveys.



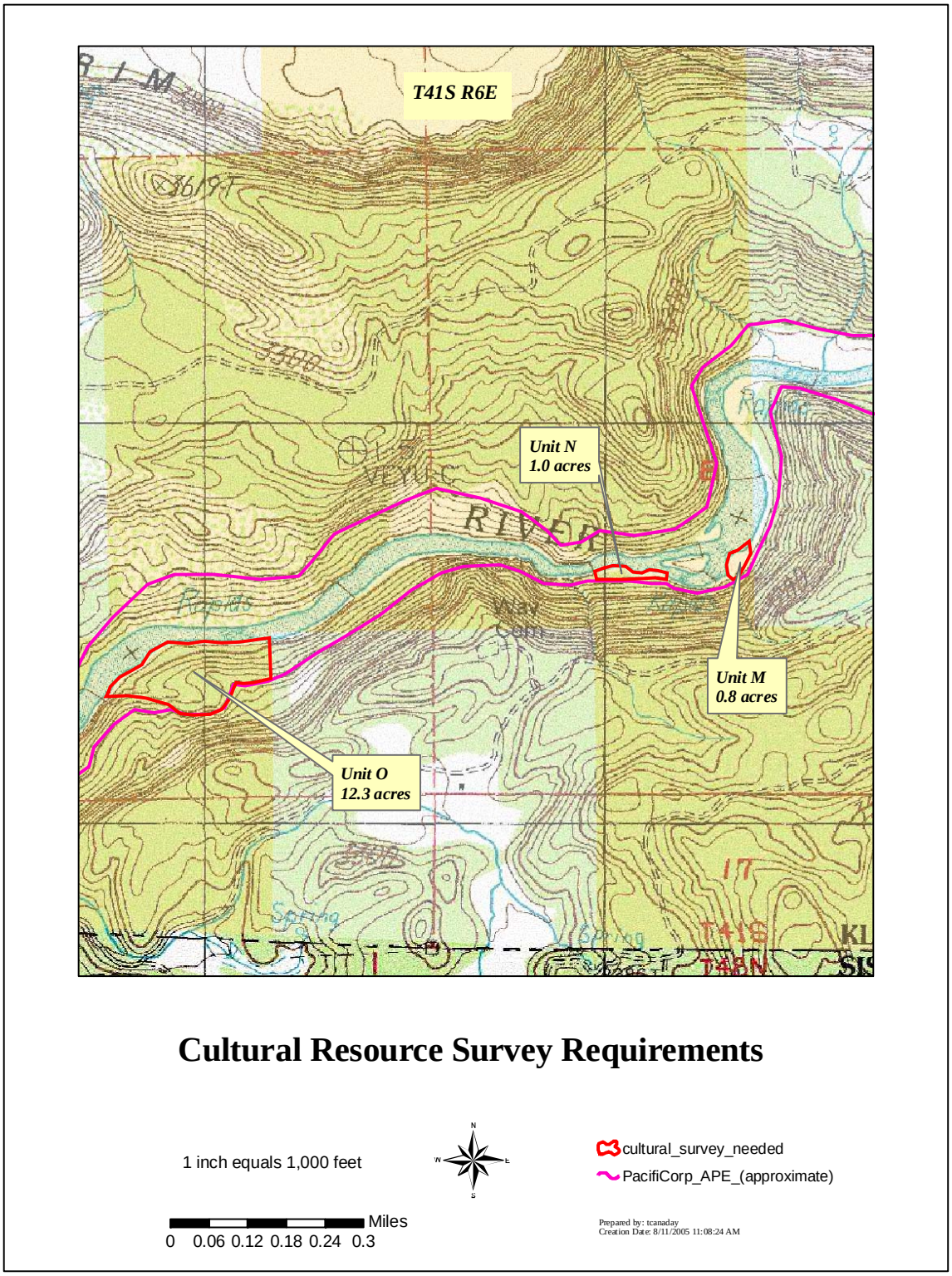
BLM Figure 5-2: Cultural resource survey requirements within the PacifiCorp defined APE. These areas within BLM land were not inspected by PacifiCorp during their surveys.



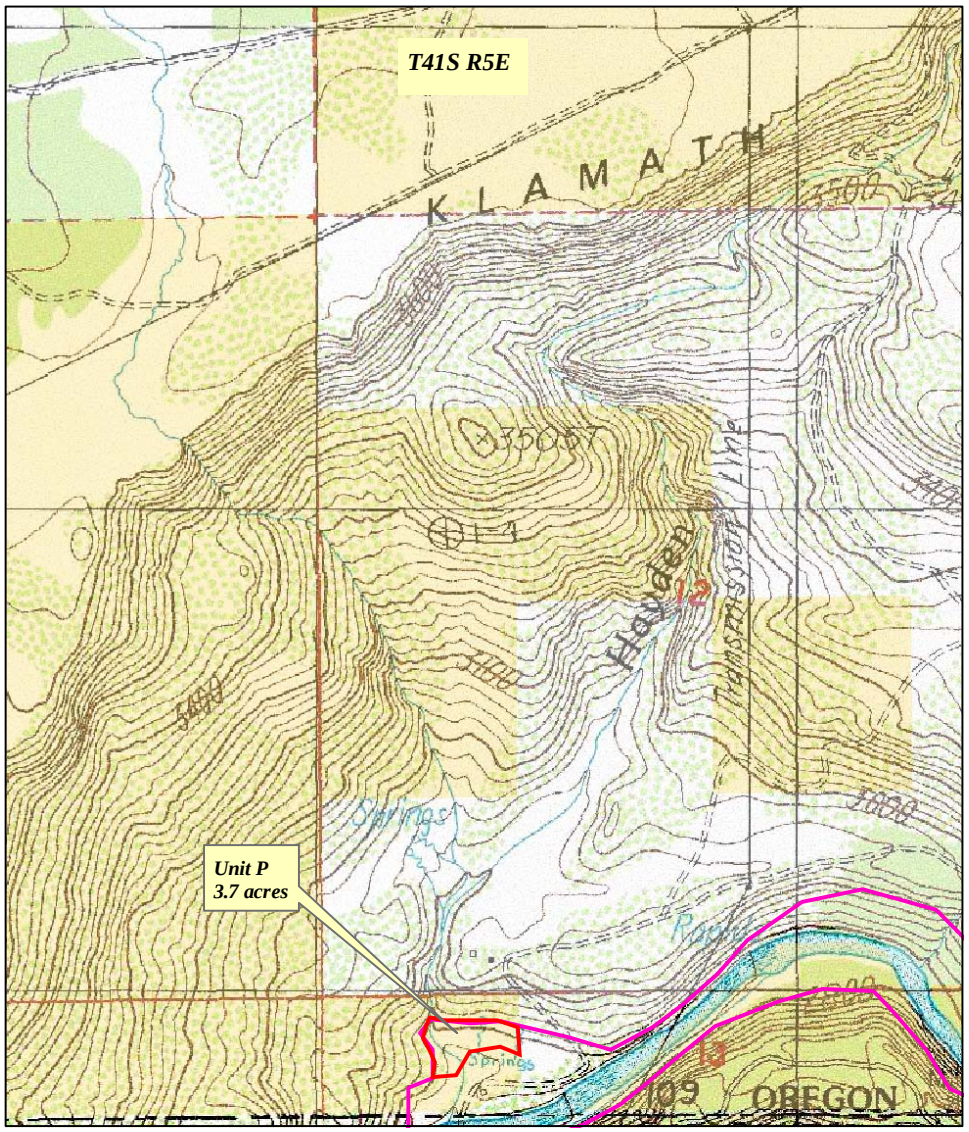
BLM Figure 5-3: Cultural resource survey requirements within the PacifiCorp defined APE. These areas within BLM land were not inspected by PacifiCorp during their surveys.



BLM Figure 5-4: Cultural resource survey requirements within the PacifiCorp defined APE. These areas within BLM land were not inspected by PacifiCorp during their surveys.



BLM Figure 5-5: Cultural resource survey requirements within the PacifiCorp defined APE. These areas within BLM land were not inspected by PacifiCorp during their surveys.



Condition No. 6 – Recreation and Aesthetic Resources Management

A. Within one year of issuance of the license, The Licensee shall develop and file with the Commission a Recreation Resources Management Plan (RRMP). At a minimum the RRMP shall:

1. Include descriptions of existing and potential recreation sites and trails on Bureau of Land Management (BLM) administered lands affected by the project, including Topsy Campground, Spring Island Boaters Access, Klamath River Campground, dispersed day-use sites and Stateline Takeout.
2. Include a schedule for implementation, maintenance, capital improvements, and monitoring for those BLM recreation facilities affected by the Project.
3. Include a schedule of costs. The Licensee shall identify responsibility for the costs of operating, maintaining and monitoring Topsy Campground, Spring Island Boaters access, the Stateline Takeout, the Klamath River Campground and dispersed day-use sites. The Licensee shall work with the BLM to identify the appropriate instrument for shared administration of these sites.
   (a) Include maintenance and development provisions for recreation sites, day-use areas, and non-motorized and motorized trails located on BLM-administered lands affected by the Project. These sites include: Topsy Campground; J.C. Boyle Bypass Reach boating and fishing access sites and associated access trails; Spring Island Boaters Access; Klamath River Campground; and dispersed day-use sites used by whitewater boaters along the Klamath River; scouting trails at major rapids; and the Stateline Takeout.
4. Include provisions for working with the BLM to define standards for facilities operation and maintenance; facility replacement, modification, or upgrade; and monitoring for those BLM recreation facilities affected by the Project.
5. Include provisions to bring facilities up to BLM standards for handicap accessibility, public health and cleanliness, safety, and security.
6. Include provisions for monitoring visitor use of BLM-administered lands that are affected by the Project at an interval no greater than five years. To assess when new facilities or management are needed, a framework for monitoring shall incorporate a feedback loop and necessary trigger points for action for adaptive management.
7. Include provisions for a visitor-use report to the BLM. The BLM shall be given the opportunity to review the report and discuss the findings with the Licensee. The report shall be filed with the Commission no later than 30 days after the BLM has submitted comments to the Licensee and the report is final.
8. Include a provision for annual review and modification of the RRMP.
9. Include a Visual Resource Management (VRM) Plan that includes provisions and guidelines for managing visual (e.g., aesthetic) resources on BLM-administered lands from the headwaters of J.C. Boyle Reservoir to Iron Gate Reservoir. The VRM plan should describe how the design, maintenance, and construction of Project facilities will maintain or preserve visual resource values. The VRM plan shall be consistent with BLM VRM objectives and guidelines (USDI BLM 1995a, pages 43-44 and Map 2-5; USDI BLM 1993, page 33). The VRM Plan shall include provisions for aesthetics at the bypass canal and other concrete structures, switch yards, power houses, buildings, penstocks, powerlines (metal structures); and Project recreation facilities including campgrounds and day-use sites. The following are examples of the types of mitigation measures that may be used to meet VRM objectives for the Project:
   (a) For bypass canal and other concrete structures: mitigate color and form contrasts by application of acid/stain agent (e.g., Permeon) to reduce contrasts in existing structures;

by addition of earthtone coloring agents in concrete mix for new structures; and in concert with vegetative screening or landscaping. Vegetative screening or landscaping may require systematic watering, fertilizing or other measures to ensure its survivability and effectiveness over the term of the license.

(b) For switch yards, power houses, buildings, penstocks, powerlines (metal structures): mitigate color and form contrasts by application of paint/stain earthtone colors selected from the surrounding natural appearing landscape colors to reduce contrasts; and in concert with vegetative screening or landscaping. Replace conductors with non-reflective materials at such time as reflectors would otherwise be replaced.

(c) For Project recreation facilities including campgrounds and day-use sites: mitigate color and form contrasts by vegetative or structural screening for all existing and newly constructed recreation facilities. Mitigate impacted areas with vegetation plantings to reduce erosion, improve aesthetics and screening.

(d) For J.C. Boyle Powerhouse and Canal access roads, Project roads, and other landform alterations: mitigate color and form contrasts by establishing vegetation. Application of soil tackifiers and bio-stimulants may be necessary to facilitate revegetation. Talus slopes and cutbanks; mitigate color and form contrasts by establishing vegetation. Application of soil tackifiers and bio-stimulants may be necessary to facilitate revegetation.

B. The Licensee shall prepare a draft RRMP after consultation with the BLM. The Licensee shall allow a minimum of 30 days for the BLM to comment and make recommendations on the draft RRMP before finalizing the plan and filing it with the Commission. The Licensee shall include with the Plan documentation of consultation, copies of comments and recommendations and include descriptions of how the recommendations, and a description of how the comments and recommendations are accommodated by the RRMP. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on Project-specific information. At the time it files the Plan with the Commission, the Licensee shall serve a copy of the filed documents upon the BLM.

C. The BLM reserves the right to require changes to the Plan by filing modifications to the RRMP within 30 days of service. Upon Commission approval, the Licensee shall implement the Plan, including any changes required by the BLM.

Rationale

Recreation Resource Management Plan

Summary Statement

The purpose of the condition is to foster a cooperative working relationship between the BLM and the Licensee to ensure: maintenance and improvement of recreation opportunities at BLM facilities which support a recreation demand that was created as a result of the Project operations (i.e., summer whitewater boating and fishing); continued provision of "a wide range of recreation opportunities that contribute to meeting projected demand within the planning area" (USDI BLM 1995a, page 47) for both public and commercial interests; the equity in assumption of costs incurred for Project-related recreation at BLM recreation facilities; and maintenance and preservation of the visual (scenic) resources on BLM-administered lands.

Recreation Opportunities and Demand

Summer whitewater rafting, base flow fishing, and reservoir-based boating, camping, and fishing are resultant of the Project. Peaking operations for power generation accommodate whitewater boating that otherwise would be absent during summer months. Predictable flows that accommodate whitewater boating have sustained a commercial whitewater boating industry on the Klamath River. In the absence of the Project, the Upper Klamath River would likely afford only technical whitewater or low-flow boating (e.g. kayaking) opportunities after midsummer. The Project has also created and sustained a demand for reservoir based recreation. In response to demand for Project-related recreation and the need for access, BLM has developed and continues to maintain recreation infrastructure within the Project boundary. BLM incurs the cost associated with construction and maintenance of this infrastructure as well as for the costs associated with staffing, planning, maintenance, and monitoring use and condition of these facilities.

Recreation use and demand for developed, staffed and maintained facilities will continue to grow as the population of the Klamath Basin expands over the next 30 to 50 years (PacifiCorp 2004k, pages 5-46-49). Increased recreation use of the Project presents a challenge to Federal land management that requires balancing resource protection with increased demand for diverse recreation opportunities. Increased recreation use of public lands without a corresponding increase in capital improvements necessary to maintain infrastructure will ultimately result in negative impacts to other resource values, the quality of the recreation experience, and to human health and safety. To date, the cost associated with developing or maintaining recreation infrastructure has mainly been borne by the BLM

BLM management direction for the Klamath River canyon calls for the operation and maintenance of the Topsy Campground, Spring Island Boaters Access, the Klamath River Campground, the Stateline Takeout, and dispersed day-use sites (USDI BLM 1995a, page 49). However, the recreation demand which BLM accommodates has increased as a function of Project operations and facilities that serve this recreation interest. To date, the BLM has had to incur all costs associated with management and maintenance of recreation facilities.

The Commission acknowledges recreation demand resultant of Project operations and requires the details of recreation management be developed through a comprehensive recreation management plan (Code of Federal Regulations - 18 CFR Ch. 1, 4-1-96 Ed.). The Commission requires that the comprehensive recreation management plan be prepared in consultation with federal agencies with managerial responsibilities for Project lands including agency recommendations for creating, preserving or enhancing recreation opportunities at the Project and in the Project vicinity.

The Licensee developed a Draft Technical Report for Recreation Resources (PacifiCorp 2003c) and the Recreation Needs Summary (PacifiCorp 2003d) that identified existing and proposed recreation facilities and opportunities for the BLM-administered lands including: Topsy Campground, Spring Island Boaters Access, Klamath River Campground, Stateline Takeout, and dispersed day-use sites. Although these needs were omitted from subsequent filings to the Commission regarding recreation needs and opportunities in the Final License Application (PacifiCorp 2004a) the recreation needs remain and should be addressed. In the absence of provisions to improve, develop, or maintain these facilities the Licensee would fail to meet existing or projected demand for recreation resources (PacifiCorp 2004k, pages 5-46 through 5-

49). The BLM condition is intended to accommodate the recreation demand that both the BLM and the Licensee have perpetuated and supported.

Topsy Campground [A.4.(a)]

The Topsy Campground has been shown to receive recreation use that is a direct result of the Project reservoir and would not have been constructed if the Project had not created a demand for this type of recreation facility. Existing recreation demand for developed camping at the J. C. Boyle Reservoir is met entirely by the Topsy Campground. The Topsy Campground is located within Powersite Withdrawal #258 authorized by Executive Order #6910, on J.C. Boyle Reservoir (BLM Map 1) and is included in the license for Project No. 2082 (Federal Power Commission 1963 - letter to BLM State Director, Oregon). The Topsy Campground is the only developed and staffed camping facility on the J.C. Boyle Reservoir. Demand for camping at Topsy Campground is high on most weekends during summer months and the number of campsites (16), group sites, and improved day-use sites are limited. In fact, the BLM has had to close the entrance to Topsy Campground on weekends when site capacity is filled.

Availability of a potable water supply at Topsy Campground has become problematic. Two wells at the site have failed due to poor water quality and currently BLM transports potable water to the site. A reliable potable water supply is a necessity for public safety and health. The Licensee recognized the need for water system improvements, stating, "BLM's water system needs refurbishment and/or a new potable well source created." (PacifiCorp 2004k, page 5-20)

The Topsy Campground access road is potholed, washboarded, and as a result is difficult to maintain. The BLM receives frequent complaints from the public regarding the condition of the road and associated dust. This situation, and other similar situations, should be evaluated in the plan to address these concerns and reduce road hazards and dust from vehicles.

The BLM and the Licensee, in the Draft Technical Report for Recreation Resources (PacifiCorp 2003c) and the Recreation Needs Summary (PacifiCorp 2003d), identified the need for a group site on J.C. Boyle Reservoir to handle large weekend gatherings, and additional day-use picnic and camping sites for Topsy Campground. Day-use and camping sites at the Topsy campground are not designed to accommodate the increased number of day-users, campers, or groups that access the area. Off-site developments at the Boyle Bluffs area are preferred as additional space for expansion at Topsy Campground is not available. The Licensee has recognized this need in the Final License Application: "Approximately 10 new RV/tent campsites will likely be needed as the BLM's Topsy Campground reaches capacity. Infill or expansion is not feasible at this location. A new day use and campground facility at Boyle Bluffs may be considered." (PacifiCorp 2004a, Exhibit E, page 7-99)

J.C. Boyle Bypass Reach [A.4.(b)]

The BLM administers lands along the J.C. Boyle Bypass Reach for fishing, hiking, sightseeing, and other dispersed recreation. The J.C. Boyle Bypass boating and fishing access sites have not been improved with signage, barriers, or designated parking spaces. Historically, the Licensee allowed angler and boater access to the reach. Additional graveled and delineated boating and fishing access sites on BLM-administered lands are needed to meet existing demand, provide safe parking and trail access to the Bypass reach. These sites were identified by the Licensee for potential development: "*J.C. Boyle Bypass Reach/Powerhouse Area Fishing Access Trails.*" There are a number of opportunities to formalize user-defined trails and/or create new hardened

fishing access trails in the J.C. Boyle bypass reach/powerhouse area. Formalized fishing access trails could be developed below J.C. Boyle dam and near the J.C. Boyle powerhouse. One or more pull-offs along the Canal Access Road could be used for parking. A second location for a formalized trail would start at the gravel parking area adjacent to the J.C. Boyle Powerhouse 'shed' and follow the river upstream. This short fishing access trail probably would require some new trail construction." (PacifiCorp 2004k, pages 5-100 and 5-101)

Spring Island Boater Access [A.4.(c)]

The Spring Island site was developed in the early 1980s by the BLM in response to public demand for a public whitewater boat launch below the J.C. Boyle Powerhouse. The BLM considered the request in consultation with PacifiCorp and whitewater outfitters. Prior to this request, the Licensee prohibited whitewater boat launches at a site immediately above the Powerhouse. PacifiCorp erected signs at the launch site to deter boater access. Since 1982, the BLM has monitored use of this site and has incurred 100% of the cost of maintenance of this facility. Monitoring and maintenance consists of regular site visits (typically twice weekly in summer months for Spring Island and Klamath River Campground) to assist boaters and collect trip reports, collect trash, maintain restroom facilities, and monitor permitted outfitters and other recreation use. BLM estimates recreation use at Spring Island at 5,000 visits per year (USDI BLM 2004a).

The access road leading to the Spring Island Boater's access is often washboarded, dusty, and difficult to maintain. Additional maintenance and re-surfacing is necessary to reduce hazards and for dust control. Additional educational and interpretation materials are needed to better inform the public about whitewater hazards and other safety concerns. These items have been identified as a recreation need in the Recreation Resources Final Technical Report (PacifiCorp 2004k, page 5-143). In addition, the BLM and National Park Service have identified the need for enhanced and up-to-date flow information for the boating public.

If the BLM were to close Spring Island Boater there would be an unmet demand for improved day-use boat launch facility below the J.C. Boyle Powerhouse. No other facility exists or is proposed by the Licensee to meet this demand.

Because this facility has been shown to receive approximately 5,000 annual recreation user visits as a direct result of the Project (flow related whitewater boating), including a substantial commercial whitewater boating industry, and would not have been constructed if the Project had not created a demand for this type of recreation facility, the Licensee shall assume some responsibility for the operations, maintenance and improvement through a negotiated agreement with the BLM.

Klamath River Campground [A.4.(d)]

The BLM's Klamath River Campground is accessed by an extremely rough road that requires maintenance including grading, rock fall protection, and rock removal. The campground would not be accessible by road if this road had not been constructed for the Project. In addition to campers, whitewater boaters and fishermen frequently use the site's facilities. The Licensee recognized the need for road improvements in its Recreation Resources Draft Technical Report (PacifiCorp 2003c, page 5-144): "Consider some improvement to the primitive access road to this site, while not attracting large crowds to this site."

BLM estimates that annual use of the site accounted for approximately 1,000 visits (USDI BLM 2004a). Approximately 70 percent of annual recreation use at this site occurs during the peak season, summer (PacifiCorp 2004k, page 5-72). The majority of visitors in the upper Klamath River participated in whitewater boating (PacifiCorp 2004k, page 3-16). The Klamath River Campground is administered by the BLM that incurs 100% of the costs associated with management, maintenance, and operation of this facility.

The campground is in need of improvement. The access road is rutted and should be improved. The Licensee recognized the need for site improvements in its Recreation Resources Draft Technical Report: "In general, these may include site improvements and/or site relocation." (PacifiCorp 2003c, page 5-144).

Overall, use of this site is considered to be approaching its recreation capacity (PacifiCorp 2004k, pages 5-72 and 5-73) Additional sites are needed to meet demand. If the BLM were to close Klamath River Campground, there would be an unmet demand for improved camping facilities below the J.C. Boyle Powerhouse. There are no other existing or proposed developed facilities for camping on this segment of the Klamath River. As this facility has been shown to receive recreation use that is a direct result of the Project roads and Project operations and would not have been constructed in the absence of the Project, the BLM believes the Licensee has some responsibility for maintaining and operating this facility.

Stateline Takeout [A.4.(e)]

The Stateline Takeout Recreation Site and access road which the BLM and PacifiCorp share responsibility for managing, receives heavy use during peak summer months. Primary recreation users include commercial whitewater rafting companies and the general public. The BLM portion of the Stateline recreation site is impacted as a function of recreation demand and lack of developed camping and day use facilities. The Stateline Recreation Site would not exist in the absence of the Project operations.

Historically, there was no public boating take-out and visitors were charged a fee to use the Copco Store as a take out. Boaters began using Stateline Takeout that is located on public land. Boaters also tried to use the Licensee's fishing access sites as take-outs. Eventually, the Licensee allowed Fishing Access 1 as a take-out, where boaters were dragging boats from the shoreline to the access road. Currently, Fishing Access 1 and Stateline provide the only public boater access. BLM has improved road access to the BLM-administered portion of the Stateline Takeout site. BLM has also provided permanent vault and rented portable toilets at both the BLM and the PacifiCorp portions of Stateline. PacifiCorp's FLA excludes the BLM portion of the Stateline Takeout site; however, the PacifiCorp portion of Stateline Takeout can only be accessed through BLM-administered lands.

The Licensee has identified several resource protection measures and recreation enhancements for the BLM-administered portion of Stateline Recreation site in the draft technical reports and needs summaries. Overall, use of this site is considered to be approaching its recreation capacity (PacifiCorp 2004k, page 5-145). Road improvements are needed to reduce erosion, rutting and impacts from uncontrolled recreation use. Designated camping areas are needed to reduce loss of vegetation and conflicts with cultural sites. These items are necessary to meet an existing recreation demand and reduce conflicts with other resources.

The BLM portion of Stateline Recreation site is the only designated camping area between Copco Reservoir and Stateline. The BLM has incurred 100% of the cost of construction, operation, maintenance, monitoring at the Stateline Takeout since the mid-1980s. The BLM will continue to incur these costs over the period of the License. Due to declining Federal budgets, it is unlikely that the BLM will be able to continue to operate this facility at the same standards for visitor health and safety while meeting an increasing public demand. If the BLM were to close Stateline Takeout due to declining Federal budgets, there would be an unmet demand for improved camping and day-use facilities between Copco Reservoir and Stateline.

As the BLM portion of the Stateline site has been shown to receive whitewater boating use that is a direct result of the Project (PacifiCorp 2004k, pages 5-145 and 5-146) and would not have been constructed in the absence of the Project, the BLM believes the Licensee has some fiscal obligation for maintenance and operation of these facilities.

Dispersed Day-use Sites [A.4.(f)]

Several dispersed and undeveloped campsites and day-use areas on BLM-administered lands receive camping, fishing and boating use. Recreationists gain access to these sites via Project roads or the Klamath River. Several sites have fire grates and picnic tables and serve as "designated" dispersed camps when summer fire restrictions are in effect. BLM administers and incurs 100% of the costs associated with management, maintenance, and operation of these dispersed day-use facilities. These day-use sites are needed to meet an existing recreation demand as identified by the Licensee (PacifiCorp 2004k, pages 5-148 through 5-150). As these day-use sites have been shown to receive recreation use as a result of the Project, the BLM believes the Licensee has some fiscal obligation for maintenance and operation of these facilities and shall negotiate an agreement with the BLM.

Monitoring and Coordination

BLM-administered lands are affected by recreation use that 1) is facilitated by Project roads, facilities, or operations; or 2) has increased as a consequence of user demands. Monitoring visitor use will aid the BLM in developing the agency's Annual Program Summary and Monitoring Report and as well aid in developing projects within the context of a five or 10-year planning horizon. BLM currently conducts yearly monitoring and collects visitor information for Topsy Campground, Spring Island Boat Access, and Klamath River Campground; and monitors whitewater boating and other recreation activities in the upper Klamath River. The Licensee recognized the need to review recreation use as well as facility maintenance and development in its draft RRMP. BLM-administered recreation facilities and roads are managed in conjunction with Project recreation facilities and roads; thus necessitating coordination to continue to meet regional recreation demands. A framework for monitoring that incorporates a feedback loop and necessary trigger points for action for adaptive management is necessary to insure that BLM facilities are adequate to meet recreation demand.

Visual Resource Management (VRM) Plan

The Commission requires discussion of scenic values and protection of this resource in coordination with Federal or state agencies with land management responsibility (18 CFR Ch. 1, 4-1-96 Ed.). The consultation must indicate the nature, extent, and results of the consultation. The report must include a description of the measures proposed by the applicant to ensure that any proposed project works, rights-of-way, access roads and other topographic alterations blend, to the extent possible with the surrounding environment. Powerlines, concrete structures, canals,

roads and other Project facilities detract from the scenic quality of the BLM-administered lands along the lower portion of J.C. Boyle Reservoir and the Upper Klamath River to Irongate Reservoir.

Strong visual contrasts are apparent in the Bypass Reach where large continuous concrete structures dominate much of the view of visitors as they descend into the canyon. (Refer to BLM Figure 6-1.) These Project facilities continue to impact aesthetic resources and do not meet BLM Visual Resource Management class III objectives for the area (USDI BLM 1995a, Map 2-5). VRM Class III objectives allow for moderate levels of change to the characteristic landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements of form, line, color, texture and scale found in the predominant natural features of the characteristic landscape.

The Klamath Falls Resource Area RMP/ROD (USDI BLM 1995a, pages 43-44) and Redding Resource Management Plan (USDI BLM 1993, page 33) requires the BLM to protect the scenic values of the Upper Klamath River, by providing for Visual Resource Management Class II management in the corridor. VRM Class II management is also to be provided within one-quarter mile of the Topsy Recreation site. VRM class II objectives allow for low levels of change to the character of the landscape. Management activities should be seen but should not attract the attention of the casual observer. Changes should repeat the basic elements of form, line, color, texture and scale found in the predominant natural features of the characteristic landscape.

BLM Figure 6-1: Photo of canal from powerhouse access road

The Licensee has indicated that BLM's VRM guidelines and standards would be used to improve some of the existing facilities which are visible from public viewing points on BLM-administered lands (PacifiCorp 2004L, pages 64-66). The BLM has consulted with the Licensee and indicated that additional facilities need to be included in the aesthetics and visual resource enhancement program as they do not meet the VRM objectives for the area. The Project facilities on BLM-administered lands impacting scenic resources include the J.C. Boyle Bypass Canal and other concrete structures, switch yards, power houses, buildings, penstocks, powerlines (metal structures); and Project recreation facilities including campgrounds and day-

use sites. Project structures require screening or concealment using methods as described in this condition in order to meet BLM VRM objectives. The VRM plan shall provide for managing landscape character in such a way as to accommodate existing and new Project facilities. Revegetation and site rehabilitation is necessary to help meet VRM plan guidelines for the Topsy Recreation site. The Licensee has identified in its Draft RRMP that the mitigation measures such as recoating or repainting facilities to reduce contrasts can be accomplished during regular Project maintenance. BLM has requested these items be accomplished within 10 years of License issuance.

The Klamath Falls Resource Area RMP/ROD also requires the BLM to "…manage designated and suitable segments of the National Wild and Scenic Rivers System to protect their outstandingly remarkable values and to maintain and enhance the natural integrity of river-related values in designated and suitable river areas." (USDI BLM 1995a) In 1994, the Upper Klamath River was designated by the Secretary of the Interior as a Scenic River and is included in the National Wild and Scenic Rivers System. Based on this, the BLM must secure interim protections specifically from the J.C. Boyle Powerhouse to the Oregon-California state line on the upper Klamath River until a river management plan has been completed (USDI BLM 1995a, page 45). Among the protections are the provisions for Visual Resource Management Class A management in the river corridor and protection of the free-flowing river values (e.g., outstandingly remarkable values) of recreation, scenic, fish, wildlife, prehistoric, and historic resources, as well as Native American traditional uses.

Condition No. 7 – Vegetation Resources Management Plan

A. Within one year of the issuance of the license, the Licensee shall prepare and file with the Commission a Vegetation Resources Management Plan which includes provisions for managing noxious and invasive plants and threatened, endangered, and sensitive (TES) plants on BLM-administered lands that are affected by the Project. The plan shall:

1. include provisions for surveying, documenting, and protecting TES plants, including a review of BLM special status species, Oregon Natural Heritage Information Center (ORNHIC), California Natural Diversity Database, and California Native Plant Society records; and
2. specifically address the maintenance of the J.C. Boyle Powerhouse, maintenance of transmission line and road rights-of-way (ROW), and use of Project roads.

B. The Licensee shall prepare a draft plan in consultation with the BLM. The Licensee shall allow a minimum of 30 days for the BLM to comment and to make recommendations on the draft plan before finalizing the plan and filing it with the Commission. The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations, and a description of how the comments and recommendations are accommodated by the Plan. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information. At the time it files the plan with the Commission, the Licensee shall submit a copy of the filed documents to the BLM.

C. The BLM reserves the right of require changes to the Plan by filing modifications to the Plan within 30 days of receipt. Upon Commission approval, the Licensee shall implement the Plan, including any changes required by the BLM.

D. The section of the Vegetation Resources Management Plan which addresses noxious and invasive plants shall include:

1. Protocol for conducting weed surveys, including a review of federal, state and local noxious weed lists, and the list of Exotic Pest Plants of Greatest Ecological Concern in California from the California Invasive Plant Council.
2. Timeline for a systematic survey of land affected by the project, including BLM-administered lands with in the Project area.
3. Protocol for producing a geospatial map (e.g., GIS map) and digital database to store information on species occurrence; distribution; status according to the Oregon Department of Agriculture (ODA) system of ranking species for control; and timing of last survey. The Licensee shall make this data base available to the BLM.
4. Proposed treatments, mitigations, and best management practices for managing weeds on BLM-administered lands that are impacted by Project maintenance, operation, and use.

E. The section of the Vegetation Resources Management Plan which addresses threatened, endangered, and sensitive (TES) plants shall include:

1. Protocol for surveying BLM-administered lands affected by the Project according to accepted protocols to determine or verify the distribution of TES species.
2. Protocol for documenting, protecting and mitigating for impacts to TES species, including a review of BLM special status species, ORNHIC, California Natural Diversity Database, and California Native Plant Society records.
3. Protocol for surveying adjacent to Project roads which cross seasonally wet meadows for occurrence of TES plant species.

Rationale

Noxious Weeds

Maintenance of the J.C. Boyle Powerhouse and Project road and transmission line ROWs as well as use of Project roads impacts vegetation resources administered by the BLM. The Licensee proposed to develop a Vegetation Resources Management Plan (PacifiCorp 2004a, Exhibit E, page 5-122) to guide vegetation and weed management and monitoring near Project facilities and roads, recreation sites, and transmission lines. In the absence of specific details about this plan, BLM has proposed a vegetation management condition that at a minimum will limit the introduction and potential spread of noxious weed species.

Vegetation maps for the Project include 165 acres adjacent to the Klamath River, Jenny Creek, and Spencer Creek and approximately 75 acres adjacent to the J.C. Boyle and Keno Reservoirs that were surveyed for botanical resources. The botanical survey is inadequate for determining the full extent of Project impacts on vegetation resources.

Noxious and invasive weeds are effective at colonizing disturbed areas. Once established these species have the capacity to invade undisturbed, adjacent sites. An integrated vegetation management strategy necessitates understanding the distribution of noxious and invasive as well as other species across the broader landscape. The limited spatial scope of the existing vegetation survey limits the ability to analyze or mitigate for effects to vegetation from Project operations.

The Final License Application (FLA) presents information on the abundance and distribution of noxious weeds and invasive non-native plants. Surveys from 2002 revealed 60 infestations and the presence of 17 target weed species. Infestations include populations of St. Johns' wort, hoary cress, Canada thistle, Dyer's woad, and Mediterranean sage (PacifiCorp 2004c, page 8-5). BLM previously mapped 52 of the 60 infestations. Previous surveys also recorded the presence of common toadflax, Himalayan blackberry, poison hemlock, and salt cedar. Also, six "widespread species" (cheatgrass, Dalmatian toadflax, medusahead, yellow starthistle, and bull thistle) were not mapped, and only their general distribution was described based on plot data. Even with the omission of this information in the FLA, the account of noxious weeds affirms the widespread distribution and abundance of noxious weeds in the Project area.

Information for noxious weeds and invasive non-native plants does not reflect the widespread distribution of various species. Because listed noxious weed species have been targeted for control by the Oregon State Weed Board, the distributions of these species should have been mapped. For example, the distribution and relative abundance of yellow starthistle, a species targeted for prevention and control by the Oregon State Weed Board, should be surveyed and mapped so appropriate treatments to control the species can be developed and implemented. Likewise, Dalmatian toadflax could be managed more effectively if the extent of the species distribution was documented and understood, since a biological invasion is most effectively controlled by treating "outlier" populations (Moody and Mack 1988). This is true for all noxious weed species; and in order to develop an effective, integrated weed management plan, the distribution of all species targeted for control is necessary.

Powerhouse maintenance, transmission line and road ROW maintenance, and use of Project roads contribute to the spread of noxious weeds and invasive non-native plant species, placing other native plant communities at risk. For example, although yellow starthistle infestations that occur along the J.C. Boyle Peaking and Bypass Reaches, the J.C. Boyle Powerhouse, and in association with Project transmission line and road ROWs may be considered outliers to larger concentrations in California, they serve as sources for further dispersal of the species across the entire Project area.

BLM management direction for the control of noxious weeds requires surveys across BLM-administered lands for noxious weed infestations, reporting to the ODA, and coordination with the ODA to reduce infestations (ODA 2005). The BLM is further required to use an integrated pest management approach to reduce or control infestations. To accomplish this, the BLM maintains a cooperative agreement with the Oregon State Weed Board. Through the Oregon State Weed Board, the BLM participates in established WMAs which include all stakeholders in order to coordinate across multiple land ownerships. Both Siskiyou and Klamath counties have established WMAs.

Threatened, Endangered, and Sensitive Species

Project impacts to TES plant species are discussed only as they relate to flow and water level manipulations. Thus, one might conclude that the Project does not affect TES plants which may occur in association with other Project features or are affected by other Project operations. Project facilities and operations directly and indirectly affect TES species and their habitat. Indirect effects include disturbance from Project operations, Project roads, and Project-related recreation.

Information regarding the abundance and distribution of TES species is based on field surveys, review of BLM, ORNHIC, California Natural Diversity Database, and California Native Plant Society records. The Licensee claims that the "intuitive controlled" survey method (Whiteaker et al. 1998; PacifiCorp 2004c, page 5-3) was used, which traverses the entire study area thoroughly enough to see a representative cross section of all the major habitats and topographic features, and then conducts a complete survey for target TES species in areas with a high potential to support these species. However, the Licensee failed to confirm information about known TES plant locations within the survey area "because of their remote location within the study area" (PacifiCorp 2004c, page 5-20). The survey focused on sites "most likely to be directly affected by Project activities," and was limited to ¼ mile (0.40 km) from Project facilities and associated recreation sites, as opposed to areas supporting potential habitat for suspected species. Thus, the location of several known populations of TES plant species that have been recorded from other sources could not be corroborated based on PacifiCorp's results. Confirmation of species presence/absence and distribution is necessary to determine the magnitude of impacts of Project operations on TES species.

Since it is unlikely that the "intuitive controlled" survey method was applied as described in the cited reference, it is unlikely that all TES plant populations within the Project area have been located. Therefore, conclusions regarding direct and indirect impacts from Project operations are incomplete. For example, bristly sedge, a BLM sensitive species believed to be extinct in Oregon, was identified along the J.C. Boyle Reservoir and the Topsy Campground subsequent to the 2002 survey. Several TES species were found in the seasonally wet, alkaline flood plains adjacent to Keno reservoir, and may be impacted by changes in reservoir management. These species are Applegate's milkvetch (federally listed as endangered), short-podded thelypodium, pendulus bulrush, Columbia yellow cress, and salt heliotrope. However, the project area has been redefined to exclude this portion of the study area.

Several other TES plant species are found in seasonally wet meadows not influenced directly by flow manipulations. However, Project roads and roads established from Project roads often cross these meadows and disrupt the natural hydrology to which these species are adapted. These species include red root yampah, Howell's yampah, and Bellinger's meadow foam.

Impacts have been described as "uncertain" and related solely to Project maintenance or flow regulation. Like the evaluation of the affect of Project operations on individual species, assessing changes in habitat as a function of Project operations is described as "difficult." Because impacts to TES plant species are inadequately described, discussion of potential future impacts is likewise inadequate. As a consequence the proposed Vegetation Resources Management Plan lacks detail describing "protections" for plant species and habitats (PacifiCorp 2004a, Exhibit E, page 5-126). Based on this inadequacy, a failure to adequately survey the Project area for TES species, and inappropriate application of the survey methodology, it is unlikely that all TES plant populations within the Project area have been located or that impacts of Project operations have been adequately described. Thus, the provisions of a Vegetation Resources Management Plan, including provisions for TES plant protection are inadequate.

Condition No. 8 – Mitigation for Impacts to Wildlife and Wildlife Habitat

A. Within two years of issuance of the license, the Licensee shall prepare and file with the Commission a Wildlife Habitat Management Plan (WHMP) for Bureau of Land Management (BLM) administered lands affected by Project operations and maintenance PacifiCorp

B. The Licensee shall prepare a draft plan after consultation with the BLM. The Licensee shall allow a minimum of 30 days for the BLM to comment and to make recommendations on the draft before finalizing the plan and filing it with the Federal Energy Regulatory Commission (Commission). The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations, and a description of how the comments and recommendations are accommodated by the Plan. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons based on project-specific information. The Licensee shall provide the BLM copies of all documents filed with the Commission.

C. The BLM reserves the right to require changes to the WHMP and will provide comments and recommendations within 30 days of receipt of the document. Upon Commission approval, the Licensee shall implement the WHMP, including any changes required by the BLM.

D. The WHMP shall include measures for:

- Wildlife Crossings and Escape Ramps for the J.C. Boyle Canal and Effectiveness Monitoring
- Western Pond Turtle Habitat and Effectiveness Monitoring
- Threatened, Endangered, Sensitive, Special Status Species Survey and Monitoring including:

(a) survey protocols for long-term survey and monitoring of TES and SS species and their habitat for BLM-administered lands within the Project to assess impacts and develop necessary mitigations. This information shall supplement the previous study completed by PacifiCorp (PacifiCorp 2004c - Threatened, Endangered, Sensitive and Special Status Species Assessment).

(b) Identify restoration, protection, and/or enhancement measures.

(c) seasonal restrictions for active nest sites on BLM-administered lands for bald eagles, golden eagles, ospreys, peregrine falcons and other raptors that are affected by Project operations.

Rationale – Wildlife Crossings and Escape Ramps for the J.C. Boyle Canal

The J.C. Boyle Canal blocks movement by individual terrestrial mammals and reptiles. The direct impact is limited to the individual animal, but there would be benefits to local populations by enhancing crossing opportunities along the canal.

The Klamath River is the only waterway that crosses the southern part of the Cascade Mountain range and is thus one of the most important big game migration and movement corridors in Oregon. The mixture of vegetation types and landforms supports a diversity of habitats and wildlife species which are designated as an Outstandingly Remarkable Value (ORV) of the

Upper Klamath Wild and Scenic River. Outstanding remarkable characteristics for wildlife include a high degree of species diversity and high wildlife habitat diversity – both of which are present in the Upper Klamath River Canyon (USDI BLM 1990a, page 3-5)

The J.C. Boyle Canal is nearly 11,000 feet (3,352 m) long and is a combination of vertical concrete walls, bedrock, and gunite-lined earthbanks (PacifiCorp 2004c, Table 6.7-8). The entire eastern or downslope wall is concrete and is 16 feet (4.9 m) tall. The west side or inner canal wall varies greatly in height above ground and accessibility. Inside the canal, the height of the freeboard (vertical distance between water and top of inside canal wall) varies depending on the amount of water in the canal, but generally exceeds several feet, so that once animals are in the water they cannot exit except at the two existing escape points. There is no way to cross the J.C. Boyle Canal (PacifiCorp 2004c). For detailed J.C. Boyle Canal wall specifications, see Figure 6.7-2 in PacifiCorp Terrestrial Resources Final Technical Report (PacifiCorp 2004c).

Habitat upslope of the J.C. Boyle Canal is a mixture of mixed conifer, ponderosa pine, and grassland habitats. Along the Bypass Reach of the Klamath River downslope of the canal, narrow patches of riparian grass and riparian shrub (primarily dogwood, willow, and ash) habitat occur intermixed with the large boulders (PacifiCorp 2004c, page 2-97). Many of the wildlife species in this area use these upslope and downslope habitats during some stage of their life cycle (PacifiCorp 2004c, 5-83). The BLM Wild and Scenic River criteria require contiguous habitat conditions to support the biological needs of the wildlife species. (USDI BLM 1990a, page 3-7). The placement and configuration of the J.C. Boyle Canal interferes with BLM's ability to meet contiguous habitat conditions of the wild and scenic river criteria.

Big game species that occur within the Project area include deer, elk, black bear and cougar. Although uncommon in the Project area, black bear and cougar either pass through or reside in the canyon. A migratory herd of 3,100 deer (ODFW estimate, 1988-1989), known as the Pokegama Herd, utilizes the area surrounding the canyon. The majority of this herd winters in and around the Project area (USDI BLM 1990a, page 2-28). The lower portion of the J.C. Boyle Bypass Reach and all of the Peaking Reach including the uplands surrounding the river lies within a larger area designated by BLM and the Oregon Department of Fish and Wildlife (ODFW) as critical deer winter range. The J.C. Boyle Canal area of the Project is in or near this critical deer winter range habitat as described in BLM's Final Eligibility Report Upper Klamath Wild and Scenic River Study. This designation is primarily due to the low elevation that gives rise to light to snow-free conditions during severe winters, providing accessible forage, easier movement, good thermal cover and early spring greenup that furnishes critically needed forage for deer coming off of winter. A small portion of this herd occurs as year-round residents of the Project area (USDI BLM 1990a, page 2-28). Deer trails parallel the right (west or uphill) side of the canal along several sections of the J.C. Boyle Canal (PacifiCorp 2004c, Figure 6.7-2). Deer tracks were observed at one of the vehicle ramps/deer escapes indicating that animals at least occasionally access the canal (likely to drink water) at those protected backwater areas (PacifiCorp 2004c).

PacifiCorp conducted a terrestrial habitat connectivity study of their North Umpqua project that involved a field assessment of wildlife movements affected by the waterways of this project. The study concluded that Project waterways may alter movement patterns or corridors, which, in turn, may make animals more susceptible to predation or hunting mortality (PacifiCorp 2004c, page 6-23). The study also suggested several management options for terrestrial habitat

connectivity focusing on project waterways. Among these recommendations was the installation of wildlife crossings.

PacifiCorp's North Umpqua study also found that populations of small mammals or amphibians are probably affected by Project waterways (PacifiCorp 2004c, page 6-23). There are at least 21 wildlife species (5 Special Status Species) that are potentially affected by the J.C. Boyle Canal that were confirmed as occurring in the study area; at least 55 other species (6 Special Status Species) potentially occur in the study area (PacifiCorp 2004c, Table 6.7-4). Many of these are small mammals and herptiles. During small mammal sampling along the J.C. Boyle Canal in 2003 there were 199 individuals (including recaptures) of at least four species documented. (PacifiCorp 2004c, Table 6.7-5). During BLM's 2000-2001 Herpetological Inventory of the Upper Klamath River Canyon, 1,087 individual herptiles representing 18 species were detected in the Project area (USDI BLM 2001b).

Small and medium-size mammals and reptiles may use the rocky habitat in the middle portions of the J.C. Boyle Bypass Reach. During small mammal trapping, several species of snakes as well as fence lizards, bobcat, raccoon and striped skunk were found immediately adjacent to the northwestern canal wall. Under current operations there is no opportunity for these species to safely cross the Canal to access riparian habitat along the Klamath River. This habitat is thought to represent important summer habitat for reptiles. In addition, even though small mammals have small home ranges, juveniles of many species disperse greater distances and may be affected by the canal (PacifiCorp 2004c).

PacifiCorp's reporting system at J.C. Boyle Canal was designed mainly to record big game mortalities, but wildlife of medium size also are noted (PacifiCorp 2004c, 6-24). Database records have been maintained since 1988. According to the data, monitoring of wildlife entrainment in the J.C. Boyle Canal appears to have been incidental (PacifiCorp 2004c, Table 6.7-2). No entrainment data was recorded between 1959 and 1988. Data collected immediately after the canal was constructed would have indicated the true affect on wildlife and surrounding habitat connectivity. Since 1988, Project personnel have documented six wildlife mortalities at the J.C. Boyle Canal/Forebay. This included five deer and one skunk collected from the J.C. Boyle Forebay trash rack. Entrainment of small animals (herptiles and small mammals) in this canal has not been assessed because the trash rack grates are too widely separated (2 inches [5 cm] gaps) to stop small animals (PacifiCorp 2004c, page 6-25).

Construction and Installation of Wildlife Crossings

Wildlife movement patterns and wildlife dispersal across the Project area is affected by the presence of the J.C. Boyle Canal. (PacifiCorp 2004c, 6.8.2, page 6-57). The canal creates a barrier to wildlife movement and poses a risk of mortality. Overall long-term effects to species may include decreased ability to locate mates, decreased parental investment/involvement with young, decreased ability to disperse, decrease in fitness and increased predation risk (Frid and Dill 2002; Sutherland et. al. 2000). The J.C. Boyle Canal presents a barrier to wildlife movement (PacifiCorp 2004a, Executive Summary, page 5-5) because the canal blocks movement of herptiles and small- to medium-sized mammals (PacifiCorp 2004c, page 4-86) and is an impassible barrier to herptiles. Building wildlife crossings that connect suitable habitat would eliminate a need for animals to enter the canal and ultimately enhance connectivity.

Pacific Gas and Electric (PG&E) assessed canal crossings to determine their effectiveness in the Upper North Fork Feather River Project (PacifiCorp 2003b, page 6-23). The survey revealed that 90% of canal crossings were successful. The study also showed that knowing where to locate escape mechanisms in canals is extremely important because animals cross at specific established locations.

During the 1970s and 1980s, several studies were conducted to document losses of big game in canals located in arid habitats of the California Central Valley and Arizona (PacifiCorp 2004c, page 6-24). The studies demonstrated that deer bridges and escapes are effective at reducing mortality. A recent study in Arizona demonstrated the importance of habitat corridors to allow deer to successful cross a large fenced canal system (PacifiCorp 2004c, page 6-24).

Construction and Installation of Wildlife Escape Ramps

USDI – BLM Instruction Memorandum No. 2004-156 (USDI BLM 2004b) requires that Water developments on public lands be designed to meet the needs of livestock, wild horses, and wildlife. To reduce the risk of wildlife fatalities, the BLM requires escape ramps in water developments. BLM policy direction, as per BLM Manual Handbook H-1741-2 (Water Developments), has been to "Install escape ramps in open water troughs and tanks to protect water quality and to reduce wildlife loss." (USDI BLM 1990b, Section II-3b)

While it may be impossible to prevent all wildlife fatalities associated with water developments, the BLM shall make a reasonable effort to ensure that these projects are as wildlife safe as reasonably possible (USDI BLM 2004b). This includes all existing and future water developments on public lands regardless of who constructed them, when they were constructed, or how construction was authorized (USDI BLM 2004b).

Effectiveness Monitoring of Wildlife Crossings and Escape Ramps

The Klamath Falls Resource Area RMP requires monitoring as part of the BLM's adaptive management strategy. The direction and guidance set forth in the RMP states that "Monitoring is an essential component of natural resource management because it provides information on the relative success of management. Monitoring results will provide managers with the information to determine whether an objective has been met and whether to continue or modify the management direction." (USDI BLM 1995a, page 85) Effectiveness monitoring is to ensure that actions meet the desired objectives (USDI BLM 1995a, page 85)

Rationale – Western Pond Turtle Habitat

Western Pond Turtle Suitable Habitat Surveys

The western pond turtle is a BLM Sensitive species in Oregon. The Project is located near the edge of the turtle's geographic range and at its upper elevational limit within this range. In Oregon, western pond turtle populations are in decline (St. John 2002; Brown et. al. 1995). The lifespan of this long-lived turtle sometimes exceeds 50 years (St. John 2002).

Western pond turtles occur throughout the Project area, although use appears to be concentrated around basking structures (exposed rocks and occasionally logs) and near areas of slower moving water. They require basking sites, such as logs, rocks, etc. (Csuti et al 1997). Basking sites for thermoregulation are an important component of western pond turtle's habitat (St. John 2002). Pond turtles are ectothermic (cold-blooded), which means that their body temperatures

are largely determined by sources of heat outside of their body (Brown et al 1995). Attaining body temperature levels suitable for activity is an important requirement of reptilian ectothermic life. "Elevated temperatures, often of narrow range and at a level characteristic for a species or group, are necessary for the vital life processes of foraging, digestion, reproduction and escape from predators." (Bury 1972) During atmospheric basking, turtles elevate and maintain body temperatures near 32 degrees Celsius through a number of thermoregulatory behaviors including: exposing shell to direct sun (heating), dunking the head, feet or body in water (cooling), changing exposure to heating and cooling sources, rotating the body axis, and extending or retracting the limbs and head (Bury and Holland 1993). Changes in water level can affect the availability of suitable basking sites along the reservoir and river shorelines. Logs that are partially submerged and available for turtles at one flow or pool level could become entirely exposed at lower flows. This would most likely occur in the J.C. Boyle Peaking Reach where daily peaking results in stage changes of several feet in some locations. Because Bury (1995) reported that basking logs are limited in this reach (PacifiCorp 2004c) dewatering of basking structures is important. In the J.C. Boyle Peaking Reach, turtles seem to be restricted to relatively few areas that still have suitable basking habitat especially under varying water levels due to peaking operations (Roninger, personal communication, 2005). It is very likely that western pond turtle populations are lower than historic levels. The survey is needed to define population habitat needs and Project impacts.

For Bureau sensitive species where lands administered or actions authorized by BLM have a significant effect on their status, BLM policy directs that Districts will protect, manage and conserve those species and their habitats such that any Bureau action will not contribute to the need to list any of these species (USDI BLM 2001a). Policy for candidate species applies to Bureau sensitive species: "For those species where lands administered by BLM or actions have a significant effect on their status, manage the habitat to conserve the species." (USDI BLM 2001a - Special Status Species Management) This includes not only inventory at the appropriate time of year in advance of BLM actions (clearances) but also general inventory where needed to determine species distribution and status and monitoring to determine the species' requirements and trends. Bureau sensitive species and their habitat will be considered priority species for inventory, planning, monitoring and management. In addition, "Management plans will be prepared when necessary and active management implemented where needed to prevent listing or to conserve the species. Progress toward meeting species management objectives will be monitored periodically." (USDI BLM 2001a)

Manual 6840 (USDI BLM 2001a) requires management plans for Bureau sensitive (BS) species where BLM lands or actions have a significant effect on their status. Districts are encouraged to review the habitats, biology, status and threats of all special status species and to develop management plans for Federal Candidate, Bureau Sensitive, and State Listed species as needed to conserve the species and habitats. They should also provide adequate information to assist in determining the location and extent of protection; acceptable mitigation (where known); monitoring plan; studies and management actions needed. General guidance may be provided in interim plans, which succinctly describe differences in species management and protection requirements.

Construction and Installation of Western Pond Turtle Basking Structure

The Topsy/Pokegama Landscape Analysis was prepared by the Klamath Falls Resource Area and the USFWS to meet requirements set forth by the Northwest Forest Plan's Aquatic

Conservation Strategy. In this plan, the BLM has been directed to "Place large logs in slow water areas known to be important western pond turtle aquatic habitat." (Bury 1995). Logs could be anchored to shore where they would be partially submerged to provide basking and escape cover…Because of the upstream dams and past harvest activity; these areas may have less instream logs than were present historically."(USDI BLM 1996)

Certain segments of the Project, like the J.C. Boyle Peaking Reach lack suitable basking sites for western pond turtles. This is among the limiting factors to pond turtle habitation of the Project area. Peaking operations for power production are another condition which has likely affected habitat suitability for the species. Peaking operations could have the effect of dislodging basking logs and dislodging logs which are not anchored to the bank or bottom. Daily water level fluctuations also increase the rate of decomposition and may make the logs unsuitable (e.g., either inaccessible due to flooding or exposure) for basking.

Peaking operations may affect pond turtles by periodically widening the distance between the water's edge and shoreline habitat, thus reducing availability of basking sites. Currently, there are few basking structures downstream of the Project facilities. The existing structures receive a high degree of use and should be protected from further degradation. Additional structures located in suitable areas of the J.C. Boyle Peaking Reach should accommodate more turtle basking at different surface water elevations (PacifiCorp 2004a). The number and distribution of these structures would be determined based on known turtle concentrations, location of recreational activity, and suitability of adjacent uplands for nesting and over wintering.

Effectiveness Monitoring of Installed Western Pond Turtle Basking Structure
The Klamath Falls Resource Area RMP requires monitoring as part of the BLM's adaptive management strategy. The direction and guidance set forth in the RMP states that "Monitoring is an essential component of natural resource management because it provides information on the relative success of management. Monitoring results will provide managers with the information to determine whether an objective has been met and whether to continue or modify the management direction." (USDI BLM 1995a, p 85) Effectiveness monitoring is to ensure that actions meet the desired objectives (USDI BLM 1995a, p 85) For Bureau Sensitive species, monitoring is required on lands administered by the BLM or actions have a significant effect on their status (USDI BLM 2001a). BLM policy further requires that monitoring be conducted to determine if protection and mitigation implemented in the field achieved management objectives.

Rationale – Threatened, Endangered, Sensitive, Special Status Species

Surveys, Habitat Protection and Improvement for SS Species on BLM-Administered Lands
The largest number of TES plant and animal species were documented in the J.C. Boyle Peaking Reach; most of the TES avian species were found in association with riparian, wetland or open water habitats. All TES herptile species, western pond turtles and TES mammals (including bats) rely on wetland and riparian habitat during some stage of their life cycle. The extent and suitability of riparian habitat would be adversely affected by proposed Project operations (PacifiCorp 2004c, 5-83 through 5-85).

The species that are likely to be affected by the increased inter-riparian shoreline distances and patchy riparian plant distribution include species that are closely tied to riparian habitat during all or part of their life history. Several amphibian species as well as small mammals, aquatic

furbearers, and some reptiles use riparian habitats for breeding, foraging or cover. Several TES and riparian focal species (RFS) including the yellow warbler (*Dendroica petechia*), song sparrow (*Melospiza melodia*), willow flycatcher (*Empidonax traillii*), black crowned night heron (*Nycticorax nytcticorax*), yellow rail (*Coturnicops noveboracensis*),western yellow-billed cuckoo (*Coccyzus americanus*), purple martin (*Progne subis*), yellow breasted chat (*Icteria virens*), foothill yellow-legged frog (*Rana boylii*), Oregon spotted frog (*Rana pretiosa*), and western toad (*Bufo boreas*), also use riparian habitats substantially more often than upland habitats. Continued water fluctuations in reservoir and riverine habitat will negatively affect amphibians (PacifiCorp 2004c, 4-84). Floodplain woodlands support higher densities of breeding birds than upland woodland or herbaceous habitats (Stauffer and Best 1980). Although birds are highly mobile, there has been some documentation that riparian connectivity plays an important role especially during dispersal. Juvenile birds are often more dependent on continuous riparian habitat for dispersal than are adults of the same species (Machtans et al 1996). The distribution of riparian habitat may have a major impact on the distribution and abundance of riparian dependent bird species. The Klamath Bird Observatory's long-term monitoring has indicated that the riparian areas are important not only for breeding, but also during fall migration (PacifiCorp 2004c, 6.8.1.3, page 6-56). Therefore, the greatest effect of the Project on passerine birds is the effect on the distribution and connectivity of riparian and wetland habitat.

Preservation of Klamath River aquatic systems and associated peripheral wetland and riparian habitat will be critical to the maintenance of wildlife populations currently existing in and around the study area. If unprotected, wetland and riparian habitat along shorelines is likely to decline in the future. Depending on which combination of water level management, wave action, and adjacent land uses (e.g., grazing and agriculture) continues to occur, habitat along Project reservoirs likely will continue to be relatively thin and botanically non-diverse without management actions specifically targeting enhancement of these areas (PacifiCorp 2004c, 7.8.2, page 7-43). Without active management, it is unlikely that riparian habitat conditions will substantially improve in the Project area even with the proposed changes in the J.C. Boyle minimum flow releases and powerhouse ramp rates. Recreation use and reservoir fluctuation regimes are Project related effects (PacifiCorp 2004a, Exhibit E, page 5-128)

The BLM special status species management requires each Field Office to: to conduct and maintain current inventories for SS species on public lands, provide for the conservation of SS species, and ensure all actions are evaluated to determine if special status species objectives are being met (USDI BLM 2001a, pages 5-6).

For all TES and SS species and their habitats it is necessary to conduct protocol surveys through the life of the new license for habitat disturbing activities on BLM-administered lands in order to evaluate the continuing impacts and maintain current inventories. Surveying initially would supplement the baseline data and subsequent surveys would allow PacifiCorp and the BLM to evaluate the impacts to TES and SS species over time. This would meet the BLM SS species policy to maintain current inventories for SS species and their habitats.

Surveys would be used to identify SS species habitat that would need protection, restoration or mitigation from Project impacts. This is consistent with current RMP direction that states that the BLM should "study, maintain or restore community structure, species composition and ecological processes of special status plant and animal habitat." and consistent with the BLM

Special Status Species Policy (USDI BLM 2001a) which states monitor and evaluate ongoing management activities to ensure conservation objectives for listed species are being met.

The Klamath Falls RMP objectives for Special Status species are to "…manage for the conservation of Federal Candidates and Bureaus Sensitive Species and their habitats so as far as not to contribute the need to list and to recover the species." (USDI BLM 1995a, page 36) The RMP also states that the BLM should "…study, maintain or restore community structure, species composition and ecological processes of special status plant and animal habitat." (USDI BLM 1995a, page 36) In order to fully evaluate the impacts from the Project an appropriate survey effort of Special Status species and their habitat is needed over the long-term to address those impacts that are on-going as a result of the Project. The surveys conducted, in preparation of the License application, in some cases did not meet BLM protocols, RMP direction, Northwest Forest Plan requirements or the policies in the BLM Special Status Species Manual. Survey protocols for most species are conducted over multiple years to increase the chances of detection.

Surveys for Survey and Manage (S&M) Aquatic and Terrestrial Mollusks are required for habitat disturbing actions under the Northwest Forest Plan (USDA USDI 1994) and subsequent 2001 Record of Decision (USDA USDI 2001). The Project has and will continue to impact suitable habitat for terrestrial and aquatic mollusks listed under the S&M species list for the Klamath Falls Resource Area. These surveys should be conducted for those species and according the S&M survey protocol. The current S&M mollusk surveys (PacifiCorp 2004c) were not conducted to Northwest Forest Plan standards (USDA USDI 2001) as stated in the FLA (PacifiCorp 2004a, Exhibit E, page 5-117).

Seasonal Restrictions for TES and SS Species

The Klamath Falls Resource Area RMP/ROD (USDI BLM 1995a, pages 34 and 38-39) provides seasonal restrictions (time of year and/or distance from sensitive area) for management activities on or adjacent to BLM-administered lands that may disturb species during critical periods of their reproduction. Those species include bald and golden eagles, peregrine falcons, Townsend's big-eared bat, northern goshawk, northern spotted owl, and osprey. The BLM condition is proposed to ensure that sensitive avian species continue to be managed consistent with BLM management objectives for these species. In the absence of BLM policy, State and Federal laws and/or regulations include provisions for such protections.

Condition No. 9 – Reservation of Section 4(e) Authorities

Authority is reserved to the Commission to require the Licensee to implement such conditions for the protection and utilization of BLM reservations as may be provided by the Secretary of the Interior, pursuant to Section 4(e) of the Federal Power Act, 16 U.S.C. § 797(e).

Rationale

This general reservation of authority allows the Secretary to consider additional data as it becomes available, to respond to changed circumstances, and modify the existing section 4(e) conditions as may be necessary. The Secretary's reservation of mandatory authorities under the FPA has been accepted by the Commission and judicially affirmed. *Wisconsin Public Services Corp.*, 62 FERC ¶ 61,905 (1993), *aff'd, Wisconsin Public Serv. Corp. v. FERC*, 32 F.3d 1165 (7th Cir. 1994).

The Klamath Tribes of Oregon hold treaty-protected property rights, including fishing and water rights, in the upper Klamath Basin. The United States and the Klamath Tribes have jointly filed claims in the State of Oregon's water rights adjudication for the surface waters of the Klamath Basin in Oregon, including instream flow claims within the Project area (from Link River Dam to the Oregon-California border), to protect the Tribes' fishing and water rights reserved to them pursuant to their 1864 Treaty with the United States. In addition, the Hoopa Valley and Yurok Tribes have confirmed reserved fishing rights in the lower Klamath Basin, and the water necessary to protect those rights may likewise be determined in a subsequent proceeding.

Any condition or prescription required for this Project's license, including those to protect federal interests, must be consistent with these reserved rights. Additional data or other information, including a binding decree resulting from the State of Oregon's water rights adjudication, may require modification to the license conditions. Thus, the Department is submitting these reservations of authority. The Department's other recommendations do not ask FERC to take any action or otherwise engage in the issues being addressed in the water rights adjudication.

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